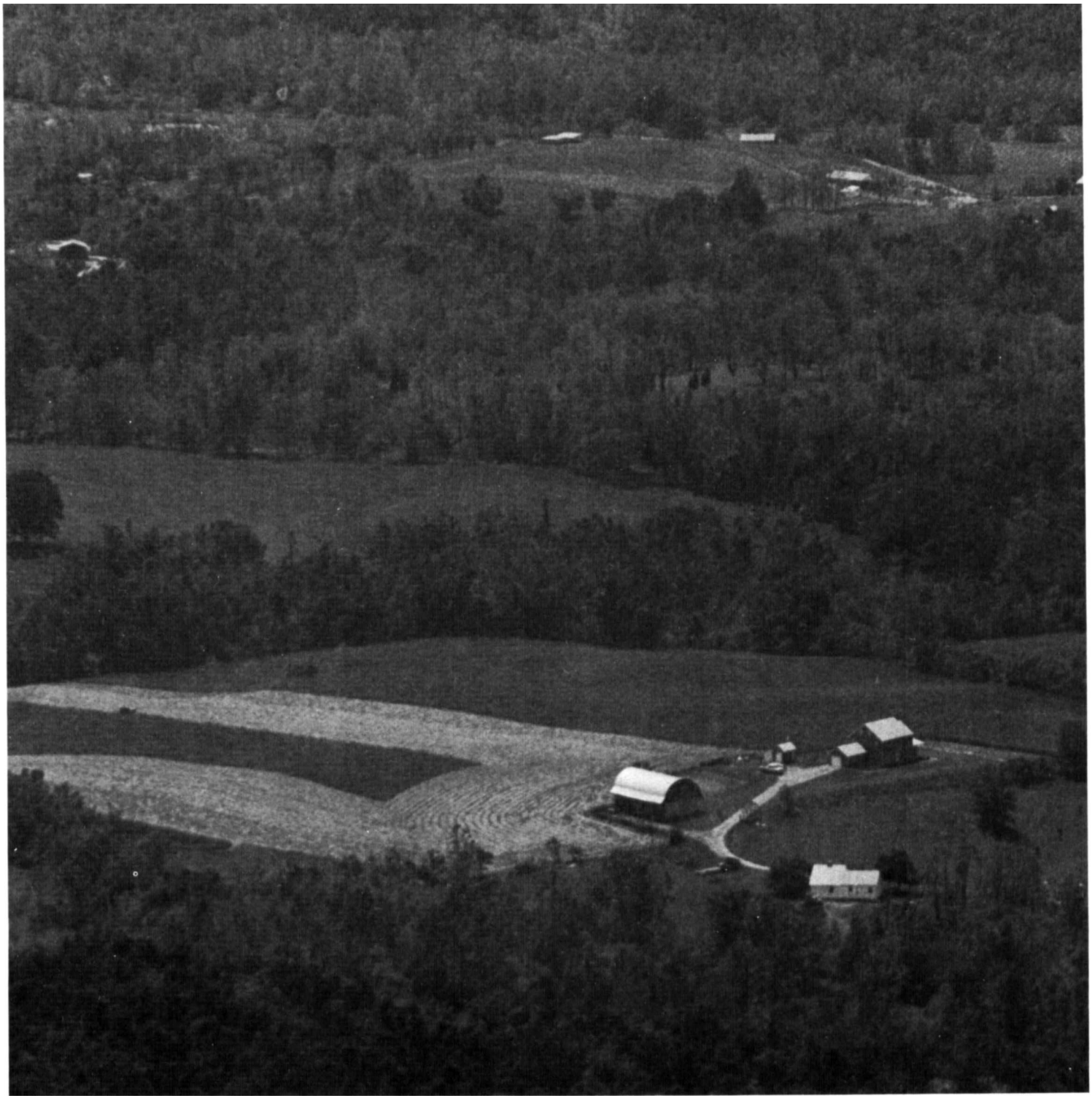
United States Department of Agriculture

Soil Conservation Service

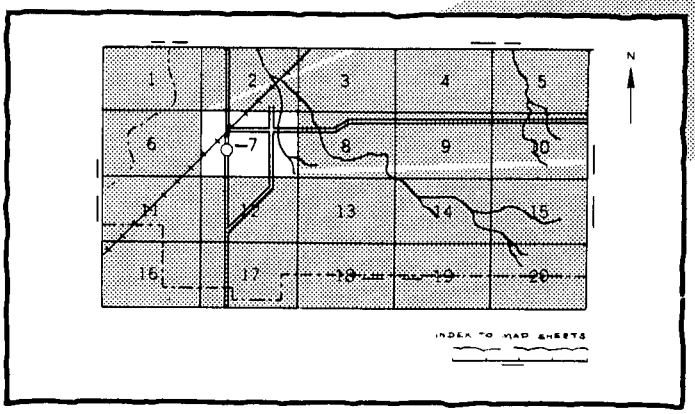
In cooperation with Virginia Polytechnic Institute and State University

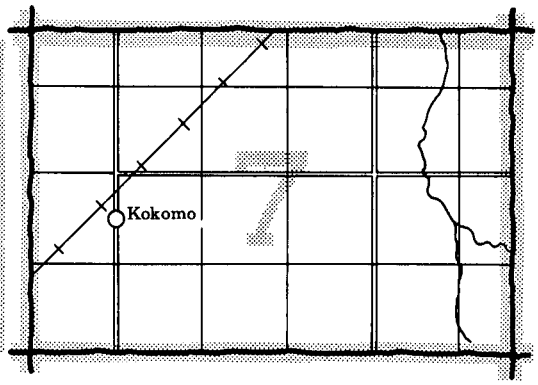
Soil Survey of Warren County Virginia



HOW TO USE

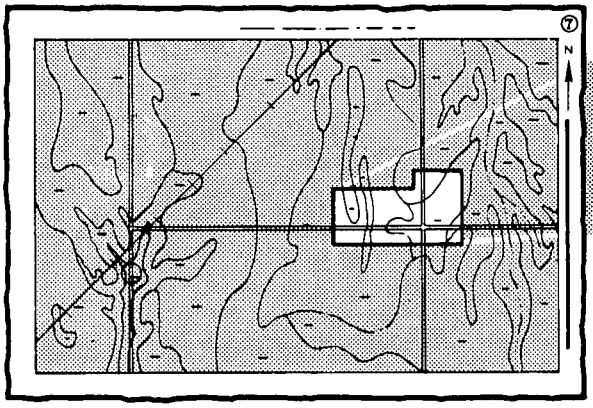
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

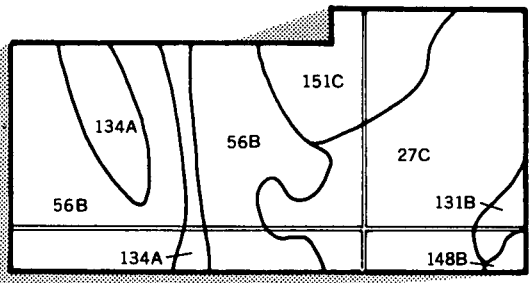




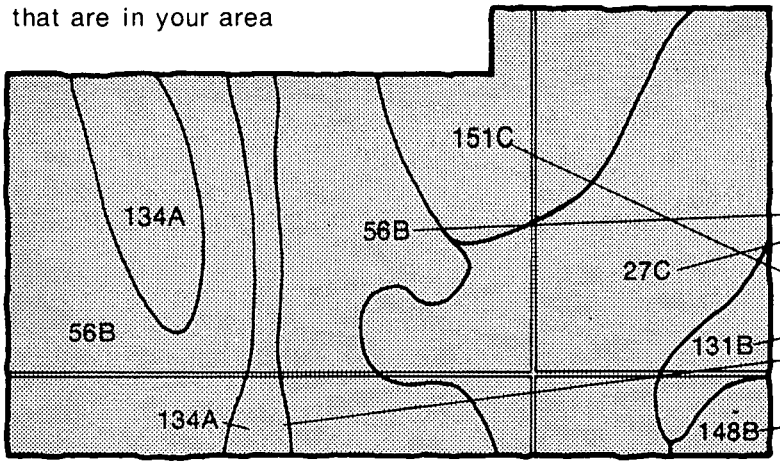
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

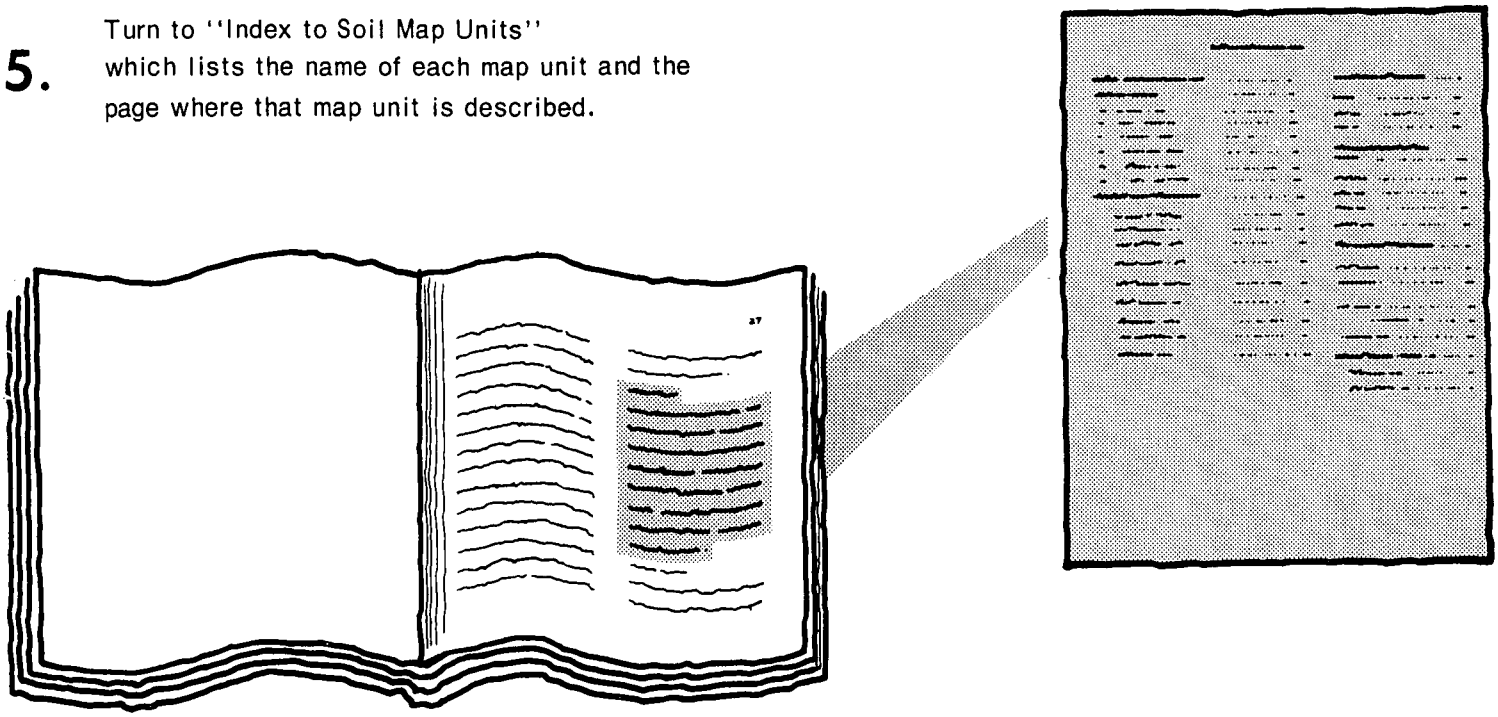


Symbols

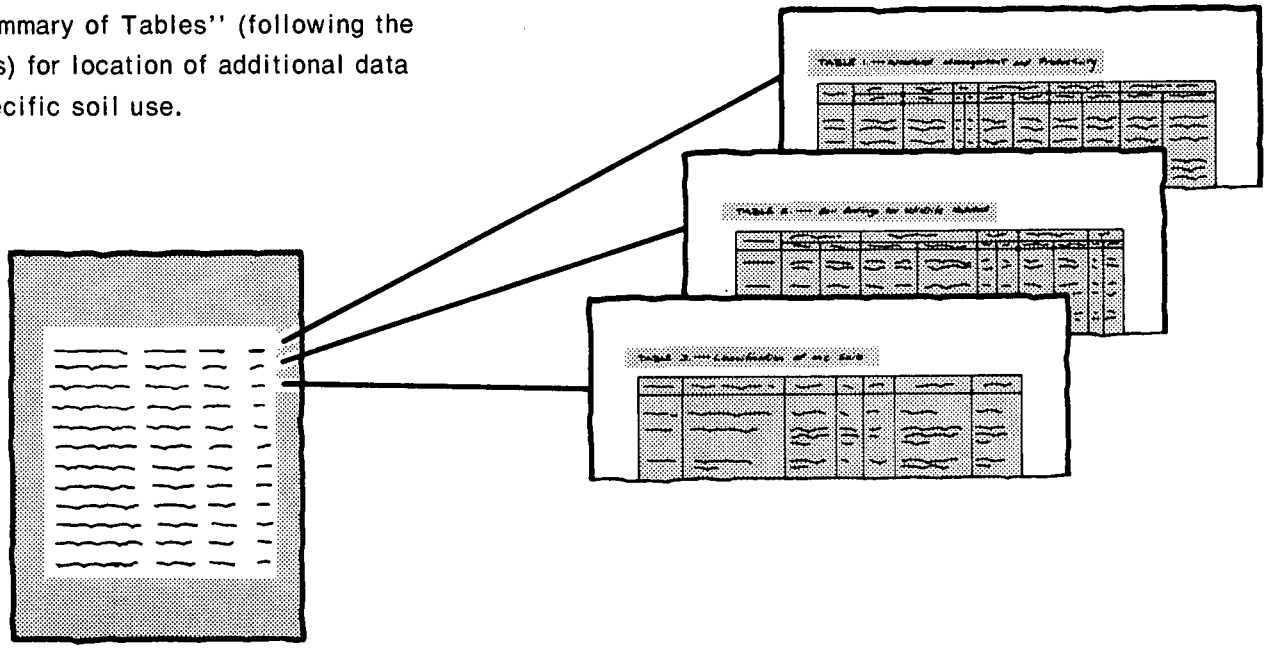
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1973-78. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979. This survey was made cooperatively by the Soil Conservation Service, the Virginia Polytechnic Institute and State University, and the Warren County Board of Supervisors. It is part of the technical assistance furnished to the Lord Fairfax Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Farmstead in an area of Montalto loam, 7 to 15 percent slopes.

Contents

Soil series

Issue January 1984

Index to map units

Summary of tables

Foreword

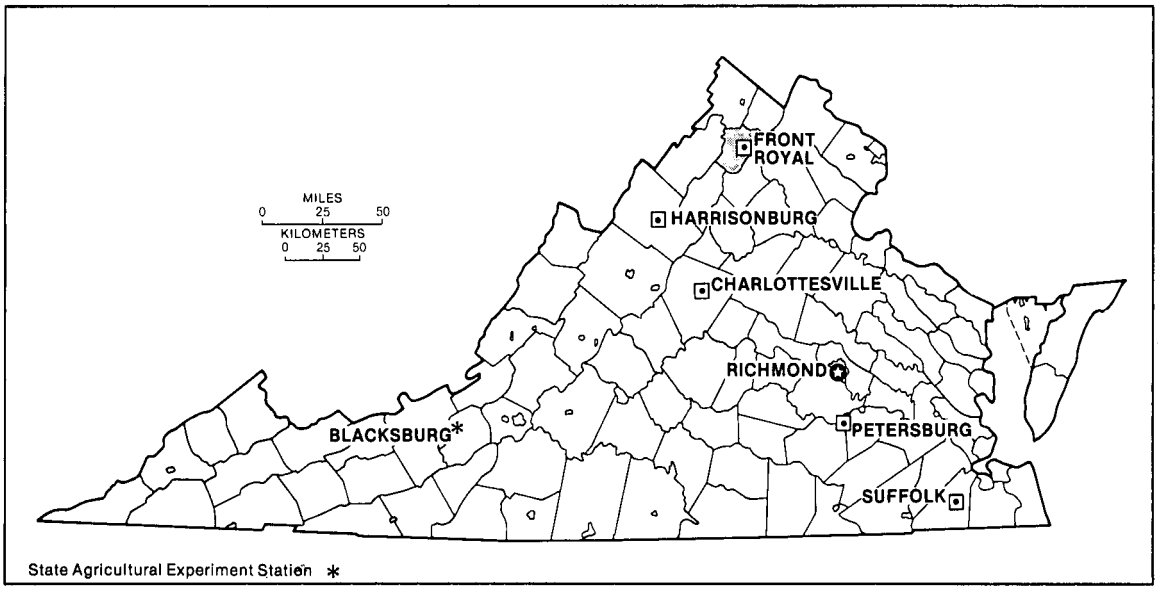
This soil survey contains information that can be used in land-planning programs in Warren County, Virginia. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Manly S. Wilder
State Conservationist
Soil Conservation Service



Location of Warren County in Virginia.

Soil survey of Warren County, Virginia

By R. Holmes, D. Wagner, and D. Racey, Soil Conservation Service

Soils surveyed by R. Holmes, L. Heidel, D. Wagner, and D. Racey
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with the
Virginia Polytechnic Institute and State University

General nature of the survey area

Warren County is in north-central Virginia. In area, it is about 219 square miles, or 140,100 acres. It is bounded on the southwest by Page County, on the southeast by Rappahannock County, on the east by Fauquier County, on the west by Shenandoah County, and on the north by Clarke and Frederick Counties. The Blue Ridge is along the eastern border, and Massanutten Mountain is along the western border. In the valley between the mountain ranges is the winding Shenandoah River, with the North Fork joining the South Fork at Riverton. Except along the rivers, the land is rolling and mountainous. The Shenandoah National Park extends into the southern part of the county, and the scenic Skyline Drive, which begins at Front Royal, runs along the crest of the Blue Ridge. The George Washington National Forest extends over the western edge of the county.

The county was formed from Shenandoah and Frederick Counties in 1836. It was named for Dr. Joseph Warren, a Boston patriot who was killed at the Battle of Bunker Hill.

According to the U.S. Bureau of Census, the population of Warren County in 1980 was 21,200, including 11,126 in Front Royal.

About 60 percent of the survey area is forest, primarily commercial forest, and about 32 percent is cropland and pasture. The rest of the area is in commercial, industrial, and residential uses.

The best cropland is in the river valley, but the rolling hills provide good pasture for livestock, chiefly cattle and hogs, which are the main source of agricultural income. Products such as apples, small grains, hay, and dairy products also are important to the economy. About 58 percent of Warren County's farms are operated on a commercial basis; the rest are maintained on a part-time basis.

The major nonfarm industries in the county produce paints, fibers, and clothing.

The main highways in Warren County are U.S. Highways 340 and 522, which run north to south. Virginia Route 55 and Interstate Highway 66 cross the county in an east to west direction, connecting the county with the Washington area to the east and Strasburg to the west. These highways intersect U.S. 11 and Interstate 81 near the Warren and Frederick County lines.

The water supply in Warren County is provided mostly by private wells and springs. The Town of Front Royal receives most of its water from Happy Creek.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Winters are cold and snowy at the higher elevations in Warren County. In the valleys, the winter brings frequent cold spells, but intermittent thaws preclude a long-lasting

snow cover. Summers are fairly warm on mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed during the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. Normal annual precipitation is adequate for all crops, although summer temperature and growing season length, particularly at higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Berryville, Virginia, in the period 1952 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 33 degrees F, and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Berryville on January 12, 1968, is -13 degrees. In summer the average temperature is 73 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on August 31, 1953, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 37 inches. Of this, 21 inches, or 57 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 4.88 inches at Berryville on September 14, 1966. Thunderstorms occur on about 30 days each year, and most occur in summer. Heavy rains, which occur at any time of year, and severe thumderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

Average seasonal snowfall is 31 inches. The greatest snow depth at any one time during the period of record was 32 inches. On an annual average of 17 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 55 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 8 miles per hour, in spring.

Physiography, relief, and drainage

Warren County lies in both the Valley and Ridge and the Blue Ridge physiographic provinces.

The Valley and Ridge province is in the western and central parts of the county. It runs roughly north to northeast. It consists of Massanutten Mountain, foot slopes, narrow ridges, flood plains, and uplands. The rock strata in this province are strongly folded. Sandstone, siltstone, shale, and limestone are the dominant types of rock.

The Blue Ridge province is in the eastern part of the county. The land surfaces range from very steep, rugged mountain slopes to gently sloping to moderately steep foothills. The Blue Ridge province is underlain by greenstone or granitic rocks. The foothills have granite and dikes of greenstone and diabase.

The highest point in the county, about 3,475 feet above sea level, is in the southeastern part of the county. The lowest point, about 490 feet above sea level, is in the north-central part.

Warren County is drained by the North and South Forks of the Shenandoah River, which come together in the north-central part of the county, at Riverton.

The surface drainage in the county is generally good except on some upland flats, some smaller, narrower flood plains, and some areas along the foot slopes of uplands.

How this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data

are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

General soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil descriptions

Soils formed in residuum of limestone and interbedded limestone and calcareous shale, and Rock outcrop; on uplands

1. Lodi-Endcav

Deep, well drained soils that have a clayey subsoil

Areas of these soils are on broad, moderately dissected uplands. They generally have long, smooth slopes. Most areas are drained by small streams, and some areas are drained by limestone sinkholes. The soils are gently sloping to very steep.

This map unit makes about 12 percent of the county. It is about 90 percent Lodi soils, 8 percent Endcav soils, and 2 percent soils of minor extent.

The Lodi soils are gently sloping to very steep, and the Endcav soils are gently sloping and strongly sloping. The Lodi soils and the Endcav soils have a surface layer of silt loam and are cherty or rocky in some areas.

Of minor extent in this map unit are well drained Carbo soils and Chilhowie soils. Also of minor extent are well drained and moderately well drained soils along drainageways.

The soils in this unit are used mainly for crops and pasture. The noncherty and nonrocky soils are used mostly as cultivated cropland and are well suited to this use. The steeper soils and the rocky and cherty soils are suited to grasses and trees and are mainly in hay, pasture, and woodland. The hazard of erosion, rockiness, coarse fragments, and steep slopes are the main limitations for farming. The clayey subsoil, rockiness, and steep slopes are the main limitations for urban development and most other uses.

2. Rock outcrop-Carbo-Chilhowie

Rock outcrop and moderately deep, well drained soils that have a clayey subsoil

Areas of this map unit are on broad, moderately dissected uplands. The areas generally have long slopes, and they have a benchlike appearance because of the Rock outcrop. Most areas are drained by small streams, and some areas are drained by limestone sinkholes. The soils are strongly sloping and moderately steep.

This map unit makes up about 2 percent of the county. It is about 24 percent Rock outcrop, 22 percent Carbo soils, 20 percent Chilhowie soils, and 34 percent soils of minor extent.

Rock outcrop consists of exposed limestone bedrock. The outcrops are mainly less than 30 feet apart. The Carbo soils are on ridgetops and side slopes. They are mainly strongly sloping and moderately steep. They have a surface layer of silt loam or silty clay loam. The Chilhowie soils are on narrow ridgetops and short, steep side slopes. Chilhowie soils are moderately deep and have a surface layer of silty clay loam.

Of minor extent in this unit are deep, well drained Endcav soils and scattered sinkholes.

The soils in this unit are used mainly for pasture. The steeper soils and the very rocky areas are mainly in pasture and woodland. The hazard of erosion, the outcrops of rock, and the coarse fragments in the soils are the main limitations for farming. The clayey subsoil, depth to bedrock, and steep slopes are the main limitations for urban development and most other uses.

These soils are poorly suited to cultivated crops and moderately well suited to pasture and hay. They are suited to woodland use.

Soils formed in alluvial or colluvial material; on flood plains, terraces, and mountain foot slopes

3. Unison-Chagrin-Dyke

Deep, well drained soils that have a loamy or clayey subsoil

Areas of these soils are on long, narrow flood plains and stream terraces along the Shenandoah River. The soils on the flood plains are nearly level, and the soils on terraces are gently sloping to moderately steep.

This map unit makes up 9 percent of the county. It is 42 percent Unison soils, 18 percent Chagrin soils, 13 percent Dyke soils, and 27 percent soils of minor extent.

The Unison and Dyke soils are on high terraces. The Chagrin soils are on flood plains and are frequently flooded. In most areas of this unit the soils have a surface layer of fine sandy loam or loam. In some areas the soils are cobbly.

Of minor extent in this unit are the well drained Buckton and Millrock soils, the moderately well drained Monongahela soils, and the somewhat poorly drained Newark soils.

Most of the acreage of this unit is used for crops and pasture. A small acreage is wooded. Flooding is the main limitation affecting the use of the Chagrin soils for farming and most other purposes.

These soils are well suited to cultivated crops. They are moderately well suited to urban and recreation uses, except where flooding occurs. They are well suited to grasses and trees.

Soils formed in residuum of shale and sandstone; on uplands

4. Berks-Blairton-Weikert

Moderately deep or shallow, well drained to somewhat poorly drained soils that have a loamy subsoil

Areas of these soils consist of hills and ridges. They generally have short, smooth slopes and are highly dissected. Most areas are drained by small streams. The soils are gently sloping to very steep.

This map unit makes up about 7 percent of the county. It is about 30 percent Berks soils, 15 percent Blairton soils, 15 percent Weikert soils, and 40 percent soils of minor extent.

The Berks soils are on narrow to moderately wide ridgetops and side slopes and are moderately deep and well drained. The Blairton soils are on the gently sloping, moderately wide upland flats. They are moderately deep and moderately well drained or somewhat poorly drained. The Weikert soils are on the noses and short, steep side slopes of ridges and are shallow and well drained. All of these soils have a surface layer of silt loam or shaly silt loam.

Of minor extent in this unit are well drained Sequoia soils, moderately well drained Zoar soils, and outcrops of shale.

The soils in this unit are mainly used for pasture. In some areas the soils are used for cultivated crops or are in woodland. Droughtiness, depth to bedrock, a seasonal high water table, and steepness of slope are the main limitations for farming. Depth to bedrock and moderately slow to rapid permeability are the main limitations for most urban uses.

These soils are suited to poorly suited to cultivated crops, depending on the steepness of slope and the depth to shale bedrock. They are poorly suited to most urban uses and suited to woodland use.

5. Berks-Weikert-Sequoia

Shallow to deep, well drained soils that have a loamy or clayey subsoil

Areas of these soils consist of hills and ridges. They generally have short to medium, smooth slopes and are highly dissected. Most areas are drained by small streams. The soils are gently sloping to very steep.

This map unit makes up about 18 percent of the county. It is 62 percent Berks soils, 23 percent Weikert soils, 9 percent Sequoia soils, and 6 percent soils of minor extent.

The Berks soils are moderately deep and are on narrow to moderately wide ridgetops and side slopes. The Weikert soils are shallow and are on noses and short, steep side slopes of ridges. The Sequoia soils are deep and are on the more nearly level areas of moderately wide to wide ridgetops. All of these soils have a surface layer of silt loam or shaly silt loam.The Berk soils and the Weikert soils have a loamy subsoil, and the Sequoia soils have a clayey subsoil.

The minor soils in this unit are moderately well drained to somewhat poorly drained. They include the Blairton, Zoar, and Buchanan soils and very shaly, shallow soils. Outcrops of shale are also included in mapping.

The soils in this unit are used mainly for pasture. In some areas the soils are used for cultivated crops or are in woodland. Droughtiness, depth to bedrock, erosion hazard, and steepness of slope are the main limitations for farming. Depth to bedrock and moderately slow permeability are the main limitations for most urban uses.

These soils are suited to poorly suited to cultivated farm crops, depending on the steepness of slope and the depth to bedrock. They are poorly suited to most urban uses and are suited to woodland use.

Soils formed mainly in greenstone; on uplands

6. Myersville-Montalto-Lew

Deep, well drained soils that have a loamy or clayey subsoil

Areas of these soils consist of high hills and ridges. They generally have medium to long, smooth slopes and are somewhat dissected. Most areas are drained by small streams. The soils are strongly sloping to very steep.

This map unit makes up about 25 percent of the county. It is 40 percent Myersville soils, 20 percent Montalto soils, 5 percent Lew soils, and 35 percent soils of minor extent.

The Myersville soils are on ridgetops and side slopes of the Blue Ridge. The Montalto soils are on side slopes of the Blue Ridge. The Lew soils are on the lower part of side slopes and near the base of the Blue Ridge. These soils have a surface layer of loam, silt loam, channery loam, or channery silt loam.

The minor soils in this unit are the moderately deep, well drained Catoctin soils and the deep, well drained Chester and Manor soils.

Most areas of this map unit are in woodland, some are in pastures, and a few are in orchards. Steepness of slope, surface stoniness, and erosion hazard are the main limitations for farming. Steepness of slope, erosion hazard, clayey subsoil, and slow permeability are the main limitations for urban uses.

These soils are suited to very poorly suited to cultivated crops, depending on steepness of slope and surface stoniness. They are suited to very poorly suited to most urban uses and well suited to woodland use.

7. Chester-Manor

Deep, well drained soils that have a loamy subsoil

Areas of these soils consist of hills and moderately dissected uplands. They generally have medium to long, smooth slopes. Most areas are drained by small streams. The soils are moderately steep to very steep.

This map unit makes up about 12 percent of the county. It is 50 percent Chester soils, 20 percent Manor soils, and 30 percent soils of minor extent.

The Chester soils and the Manor soils are on ridgetops and side slopes. The minor soils in this unit are deep, well drained Myersville, Montalto, and Lew soils.

Most of the acreage of this unit is in woodland; some is in pasture. Steepness of slope, stoniness, and erosion hazard are the main limitations for farming and for urban uses.

The soils are suited to very poorly suited to cultivated crops, depending on steepness of slope and surface stoniness. They are suited to very poorly suited to most urban uses and well suited to woodland use.

8. Cataska-Dekalb

Shallow or moderately deep, well drained soils that have a loamy subsoil

Most areas of these soils are high on hills and ridges. They generally have short to medium, smooth slopes and are somewhat dissected. Most areas are drained by medium and small streams. The soils are strongly sloping to very steep.

This map unit makes up about 6 percent of the county. It is 45 percent Cataska soils, 40 percent Dekalb soils, and 15 percent soils of minor extent.

The Cataska soils are shallow to bedrock and are on ridges and side slopes of the foothills of the Blue Ridge. The Cataska soils have a slaty silt loam surface layer. The moderately deep Dekalb soils are on ridgetops and side slopes. They have a channery loam surface layer.

Of minor extent in this unit are well drained Lew and Hawksbill soils; very slaty, shallow soils; and small spots of slate outcrops.

Most of the acreage of this unit is in woodland; some is in pasture. Steepness of slope, slate fragments in the profile, and erosion hazard are the main limitations for farming. Steepness of slope and depth to bedrock are the main limitations for most urban uses.

The soils in this unit are very poorly to poorly suited to cultivated crops, depending on steepness of slope and content of coarse fragments in the profile. They are very poorly suited to most urban uses, and they are very poorly suited to suited to woodland use.

Soils formed in residuum of sandstone and shale; on uplands

9. Rigley-Drall-Weikert

Deep or shallow, well drained and excessively drained soils that have a loamy or sandy subsoil

Areas of these soils are on mountainsides and mountaintops. They generally have short, irregular slopes and are somewhat dissected. Most areas are drained by small streams. The soils are generally moderately steep to very steep.

This map unit makes up about 5 percent of the county. It is 40 percent Rigley soils, 9 percent Drall soils, 9 percent Weikert soils, and 42 percent soils and miscellaneous areas of minor extent.

The very steep Weikert soils are on convex slopes. The steep Rigley soils are on concave slopes. The Drall soils are on the mountaintops and side slopes. The Rigley soils are deep and have a surface layer of sandy loam, the Weikert soils are shallow and have a surface layer of shaly silt loam, and the Drall soils are deep and have a surface layer of loamy sand. All of these soils are droughty.

Of minor extent in this unit are well drained Berks soils and somewhat poorly drained Buchanan soils, areas of sandstone and shale outcrop, and Rubble land.

The soils in this unit are used mainly for woodland. Steep slopes, coarse fragments, and shallowness to bedrock are the main limitations for farming and urban uses.

These soils are very poorly suited to cultivated farm crops and to urban uses. They are fairly suited to very poorly suited to woodland use.

10. Weikert-Berks-Buchanan

Shallow to deep, well drained and somewhat poorly drained soils that have a loamy subsoil

Areas of these soils are on the east-facing slopes of Massanutten Mountain. They generally have short to medium, smooth slopes and are highly dissected. Most areas are drained by small streams. The soils are strongly sloping to very steep.

This map unit makes up about 4 percent of the county. It is 30 percent Weikert soils, 25 percent Berks soils, 20 percent Buchanan soils, and 25 percent soils of minor extent. The Weikert soils are on steep, convex slopes. The Berks soils are on narrow ridgetops. The Buchanan soils are on the lower foot slopes. The Weikert soils are shallow and the Berks soils are moderately deep. These soils have a surface layer of shaly silt loam and are well drained. The Buchanan soils have a surface layer of fine sandy loam and a fragipan that inhibits the downward movement of water. They are somewhat poorly drained.

The minor soils in this unit are the excessively drained Drall soils.

Most of the acreage of this unit is wooded. Some is cleared for pasture. Steep slopes, coarse fragments, and depth to bedrock are the main limitations for farming and for urban and recreation uses.

The soils in this unit are poorly suited to use as cultivated cropland and to urban uses. They are suited to poorly suited to woodland use.

Detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Buckton series, for example, was named for the community of Buckton in Warren County.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Buchanan fine sandy loam, 7 to 15 percent slopes, is one of two phases in the Buchanan series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Chester-Manor very stony complex, 15 to 25 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Myersville and Montalto very stony soils, 15 to 25 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, and dumps is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil descriptions

1B—Berks shaly silt loam, 2 to 7 percent slopes. This moderately deep, gently sloping, well drained soil is on broad, dissected uplands. Slopes are smooth and commonly complex. They are about 100 to 500 feet wide. Areas of this soil are irregularly shaped and range from 3 to 100 acres or more.

Typically, the surface layer is yellowish brown shaly silt loam about 5 inches thick. The subsoil and the substratum are yellowish brown very shaly silt loam. Shale bedrock is at a depth of 32 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Blairton and Weikert soils. These included soils make up about 5 to 10 percent of this map unit. Also included are small areas of soils that have a silty clay loam surface

layer and small areas of Rock outcrop. These areas make up about 5 to 10 percent of this map unit.

Permeability of this Berks soil is moderate, and the available water capacity is low. Runoff is medium. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 32 inches, but shale fragments limit root growth below a depth of 9 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are in hay and pasture crops. A few areas are in woodland or orchards.

This soil is well suited to cultivated crops and to hay crops. It is droughty in dry periods. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is moderately high. The wooded areas of this soil are managed mostly for pine. The survival of seeds and seedlings is affected by droughtiness during the growing season.

Depth to bedrock is the main limitation for nonfarm uses of this soil. It especially limits excavation and the use of this soil for septic tank absorption fields, trench type sanitary landfills, roadfill, and sites for dwellings with basements.

The capability subclass is IIe.

1C—Berks shaly silt loam, 7 to 15 percent slopes. This moderately deep, strongly sloping, well drained soil is on broad and dissected uplands. Slopes are smooth and commonly complex. They are about 100 to 500 feet wide. Areas of this soil are irregularly shaped and range from 3 to 100 acres or more.

Typically, the surface layer is yellowish brown shaly silt loam 5 inches thick. The subsoil and the substratum consist mostly of yellowish brown very shaly silt loam. Shale bedrock is at a depth of 32 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Blairton and Weikert soils. These included soils make up about 5 to 10 percent of this map unit. Also included are small areas of soils that have a silty clay loam surface layer and small areas of Rock outcrop. These inclusions make up about 15 percent of this map unit.

Permeability of this Berks soil is moderate, and the available water capacity is low. Runoff is medium to rapid. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 30 inches, but shale fragments limit root growth below a depth of 14 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are in hay or pasture crops. A few areas are in woodland or orchards.

This soil is moderately well suited to cultivated crops and hay crops. It is droughty in dry periods. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of this soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is moderately high. The wooded areas of this soil are managed mostly for pine. The survival of seeds and seedlings is affected by droughtiness during the growing season.

The moderate depth to bedrock and the slope are the main limitations for nonfarm uses of this soil. Depth to bedrock limits excavation and the use of this soil for septic tank absorption fields, sewage lagoons, sanitary landfills, and roadfill. Slope limits excavation and the use of this soil for dwellings, local roads and streets, and sewage lagoons.

The capability subclass is IIIe.

1D—Berks shaly silt loam, 15 to 25 percent slopes. This moderately deep, moderately steep, well drained soil is on broad, dissected uplands. Slopes are smooth and commonly complex. They are about 100 to 500 feet wide. Areas of this soil are irregular in shape and range from 3 to more than 100 acres.

Typically, the surface layer of this Berks soil is yellowish brown silt loam about 5 inches thick. The subsoil and the substratum consist mostly of yellowish brown very shaly silt loam. Shale bedrock is at a depth of 32 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Weikert soils. These included soils make up about 10 to 15 percent of this map unit. Also included are small areas of soils that have a silty clay loam surface layer and small areas of Rock outcrop. These areas make up about 10 percent of this map unit.

Permeability of this Berks soil is moderate, and the available water capacity is low. Runoff is rapid. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 30 inches, but shale fragments limit root growth below a depth of 14 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are in pasture crops. A few areas are in woodland or orchards.

This soil is poorly suited to cultivated crops and moderately well suited to hay crops. It is droughty during dry periods. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff and erosion are excessive.

The potential for trees on this soil is moderate on the south-facing slopes and moderately high on the north-facing slopes. The wooded areas of this soil are managed mostly for pine. The survival of seeds and seedlings is affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby reduce erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope and moderate depth to bedrock are the main limitations for nonfarm uses of the soil. Slope and depth to bedrock limit the use of this soil for septic tank absorption fields, sewage lagoons, sanitary landfills, and roadfill. Slope limits excavation and the use of the soil as a site for buildings, local roads and streets, and most recreation uses.

The capability subclass is IVe.

2B—Blairton silt loam, 2 to 7 percent slopes. This moderately deep, gently sloping, somewhat poorly drained to moderately well drained soil is adjacent to the heads of streams and in broad upland depressions. Slopes are smooth or slightly concave or convex and are about 100 to 600 feet long. Areas of this soil are commonly irregular in shape and parallel the course of the drainageway. They range from 3 to more than 80 acres.

Typically, the surface layer of this Blairton soil is dark brown silt loam about 5 inches thick. The subsoil, which extends to a depth of 21 inches, is yellowish brown silt loam and shaly silty clay loam with mottling in the lower part. The substratum between depths of 21 and 36 inches is mottled grayish brown very shaly silt loam. Below that is acid, light olive brown and very dark grayish brown, fractured shale and sandstone bedrock.

Included with this soil in mapping are small areas, generally less than 3 acres, of Berks, Clearbrook, and Weikert soils. The included soils make up about 25 percent of this map unit.

Permeability of this Blairton soil is moderately slow. The available water capacity is low. Runoff is medium. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends below a depth of 21 inches, but root growth is restricted by the seasonal high water table, which is at a depth of 1/2 foot to 3 feet. The surface layer and the subsoil are commonly strongly acid or very strongly acid unless lime has been applied.

Most areas of this soil are in hay or pasture crops. Many areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness. The soil is droughty during the growing season. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees on this soil is moderately high. The wooded areas of this soil are managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

The seasonal high water table, moderate depth to bedrock, and hazard of frost action are the main limitations for nonfarm uses. The seasonal high water table and the depth to bedrock limit the use of this soil for septic tank absorption fields, sewage lagoons, roadfill, and sanitary landfills. The high water table limits excavation and the use of this soil as a site for dwellings and local roads and streets. The hazard of frost action limits the use of this soil as a site for local roads and streets.

The capability subclass is IIIw.

2C—Blairton silt loam, 7 to 15 percent slopes. This moderately deep, strongly sloping, somewhat poorly drained to moderately well drained soil is adjacent to the heads of streams and in broad upland depressions. Slopes are smooth or slightly concave or convex and are about 100 to 600 feet long. Areas of this soil are commonly irregular in shape and parallel the course of the drainageway. They range from 3 to more than 80 acres.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil, which extends to a depth of 21 inches, is yellowish brown silt loam and shaly silty clay loam with mottling in the lower part. The substratum to a depth of 36 inches is a mottled, grayish brown very shaly silt loam. Below that is acid, light olive brown and very dark grayish brown, fractured shale and sandstone bedrock.

Included with this soil in mapping are small areas, generally less than 3 acres, of Berks, Clearbrook, and Weikert soils. They make up about 25 percent of this map unit.

Permeability of this Blairton soil is moderately slow. The available water capacity is low. Runoff is medium to rapid. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends below a depth of 21 inches, but root growth is restricted by the seasonal high water table, which is at a depth of 1/2 foot to 3 feet. The surface layer and the subsoil are commonly strongly acid or very strongly acid unless lime has been applied.

Most areas of this soil are in hay or pasture crops. Many areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness. The soil is droughty during the growing season. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees is moderately high. The wooded areas of this soil are managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

The seasonal high water table, moderate depth to bedrock, and hazard of frost action are the main limitations for nonfarm uses. The high water table and the depth to bedrock limit the use of this soil for septic tank absorption fields, sewage lagoons, roadfill, and sanitary landfills. The seasonal high water table limits excavation and the use of this soil as a site for dwellings and local roads and streets. The hazard of frost action limits the use of this soil as a site for local roads and streets.

The capability subclass is IVe.

3C—Buchanan fine sandy loam, 7 to 15 percent slopes. This deep, strongly sloping, somewhat poorly drained soil is on broad, concave lower-lying foot slopes of mountains. Slopes are smooth and are about 200 to 2,000 feet long. Shallow, intermittent drainageways commonly cross this soil. Areas of this soil follow the mountain ranges and are irregularly shaped. They range from 5 to several hundred acres.

Typically, the surface layer of this soil is light yellowish brown fine sandy loam about 7 inches thick. The subsoil to a depth of about 20 inches is mottled, light yellowish brown loam. A fragipan of mottled, strong brown and yellowish brown, brittle channery sandy clay loam is between depths of 20 and 60 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Rigley, Berks, and Weikert soils. These soils make up about 20 percent of this map unit. Also included are small areas of very stony soils and small areas of wet soils. These make up less than 5 percent of the map unit.

Permeability of this Buchanan soil is moderate above the fragipan and slow in the fragipan. The available

water capacity is low. Runoff is medium. Tilth is fair. The soil is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. Root growth is restricted by the fragipan, which is commonly at a depth of 20 to 24 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime and fertilizer have been applied.The seasonal high water table is at a depth of 1/2 foot to 3 feet.

Most areas of this soil are in woodland. A few areas are in pasture and hay crops.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness and restricted root growth. The soil is droughty during the growing season. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

The soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil can help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees on this soil is moderately high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The seasonal high water table and the slowly permeable fragipan are the main limitations for nonfarm uses of this soil. The high water table limits excavation and the use of the soil as a site for buildings, sanitary facilities, and most recreation uses. The slowly permeable fragipan limits the use of this soil as a septic tank absorption field.

The capability subclass is IIIe.

4C—Buchanan very stony fine sandy loam, 7 to 15 percent slopes. This deep, strongly sloping, somewhat poorly drained soil is on broad, concave lower lying foot slopes of mountains. Slopes are smooth to irregular and are about 200 to 2,000 feet long. Shallow, intermittent drainageways commonly cross this soil. About 3 to 15 percent of the surface is covered by sandstone and quartzite stones. Areas of this soil follow the mountain ranges and are irregularly shaped. They range from 10 to several hundred acres.

Typically, the surface layer of this soil is light yellowish brown very stony fine sandy loam about 7 inches thick. The subsoil to a depth of about 20 inches is mottled, light yellowish brown loam. A fragipan of mottled, strong brown and yellowish brown, brittle channery sandy clay loam is between depths of 20 and 60 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Rigley, Berks, and Weikert soils. These soils make up about 15 percent of this map unit. Also included are small areas of wet soils along the drainageways and some extremely stony soils. These make up less than 5 percent of the map unit.

Permeability of this Buchanan soil is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The soil is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. Root growth is restricted by the fragipan, which is commonly at a depth of 20 to 24 inches. The surface layer and the subsoil are commonly strongly acid.The seasonal high water table is at a depth of 1/2 foot to 3 feet.

Most areas of this soil are in woodland. A few areas are in pasture.

This soil is not suited to cultivated crops. Stones damage tillage equipment and interfere with planting. The soil is droughty during the growing season. The hazard of erosion is severe and is a major management concern.

The soil is poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil can help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees on this soil is moderately high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The seasonal high water table and the slowly permeable fragipan are the main limitations for nonfarm uses of this soil. The high water table limits excavation and the use of the soil as a site for buildings, sanitary facilities, and most recreation uses. The slowly permeable fragipan limits the use of this soil as a septic tank absorption field.

The capability subclass is VIs.

5—Buckton silt loam. This deep, level or nearly level, well drained soil is on flood plains. Areas of this soil are commonly elongated and follow the course of the adjacent stream and are 200 to 500 feet wide. They range from 5 to 40 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper 22 inches of the underlying material is brown silt loam, and the next 19 inches is dark brown silt loam. From 48 to at least 73 inches is brown fine sand.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Chagrin and Millrock soils. These included soils make up about 10 percent of this map unit.

Permeability of this Buckton soil is moderate, and the available water capacity is moderate to high. Runoff is slow. Tilth is good, and the soil is medium in natural fertility and moderate in organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 60 inches. The surface layer is neutral to moderately alkaline, and the subsoil is mildly alkaline or moderately alkaline. The soil is occasionally flooded for very brief periods in winter and spring.

Most areas of this soil are in cultivated crops. A few areas are in woodland.

This soil is well suited to cultivated crops and to hay crops. The hazard of erosion is slight and is not a major management concern. The need for fertilizer is a management concern. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system increase the content of organic matter and maintain the tilth of the soil. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of fertilizer can help to maintain pastures.

The potential for trees on this soil is high. The wooded areas of this soil are managed mostly for hardwoods.

Seasonal flooding is the main limitation for nonfarm uses of this soil.

The capability subclass is IIw.

6C—Carbo-Endcav silty clay loams, very rocky, 7 to 15 percent slopes. This map unit consists of moderately deep and deep, strongly sloping, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. These soils are on side slopes and tops of hills and ridges. Areas of these soils are irregularly rectangular or long and winding and are 3 to 200 acres or more. Slopes are smooth, commonly complex, and 50 to 300 feet long. Rock outcrops are about 30 to 100 feet apart and cover 1 to 10 percent of the surface. Sinkholes are common throughout areas of this map unit.

This map unit is about 50 percent Carbo soil, 45 percent Endcav soil, and 5 percent soils of minor extent.

Typically, the surface layer of the Carbo soil is dark yellowish brown silty clay loam 7 inches thick. The subsoil, about 25 inches thick, is strong brown and dark brown clay. Limestone bedrock is at a depth of 32 inches.

Typically, the surface layer of the Endcav soil is dark yellowish brown silty clay loam about 7 inches thick. The subsoil, about 43 inches thick, is strong brown and yellowish brown clay. Hard limestone bedrock is at a depth of 50 inches.

Included with these soils in mapping are small intermingled areas, generally less than 3 acres, of Chilhowie soils that have slopes of less than 7 percent. Also included are small areas of severely eroded soils that have a surface layer of silty clay or clay.

Permeability of the Carbo and Endcav soils is slow, and the available water capacity is low. Runoff is medium. Tilth is fair when the moisture content of the soil is optimum for tillage. These soils are medium in natural fertility and low in organic matter content. The subsoil has high shrink-swell potential. The root zone extends to bedrock. The material making up the surface layer and subsoil of the Carbo soils is commonly very strongly acid to mildly alkaline. The material making up the surface layer and subsoil of the Endcav soils is commonly strongly acid to neutral.

Most areas of these soils are in pasture. A few areas are in hay crops or woodland.

These soils are poorly suited to cultivated crops. Rock outcrop is a major management concern on these soils. Other management concerns are the moderate hazard of erosion, the need to increase the organic matter content, and the need for lime and fertilizer.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and use of lime and fertilizer can help to maintain pastures. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees is moderately high for the Carbo soil and high for the Encav soil. The soils are managed for pine and hardwood. Rock outcrop hinders the use of timber equipment.

Depth to rock, Rock outcrop, slow permeability, high shrink-swell potential, and low strength are the main limitations for nonfarm uses. Depth to rock and slow permeability limit the use of these soils for septic tank absorption fields. Depth to rock is the dominant limitation for shallow excavations and for sanitary landfills. High shrink-swell potential generally is the main limitation to the use of these soils as a site for dwellings. Low

strength and high shrink-swell potential are limitations for local roads and streets.

The capability subclass is VIs.

7C—Carbo-Endcav-Rock outcrop complex, 7 to 15 percent slopes. This map unit consists of moderately deep and deep, strongly sloping, well drained soils and Rock outcrop that are so intermingled that it is not practical to separate them at the scale used in mapping. The map unit is on side slopes and tops of hills and ridges. Slopes are commonly complex and are 100 to 400 feet long. Rock outcrops are 10 to 30 feet apart. A few sinkholes are in this unit. Areas are irregularly shaped and cover 10 to 100 acres or more.

Of the total mapped acreage, about 35 percent is Carbo soils, 30 percent is Endcav soils, and 30 percent is Rock outcrop. Soils of minor extent make up the rest.

Typically, the surface layer of the Carbo soils is dark yellowish brown silty clay loam 7 inches thick. The subsoil, about 25 inches thick, is strong brown and dark brown clay. Limestone bedrock is at a depth of 32 inches.

Typically, the surface layer of the Endcav soils is dark yellowish brown silt loam about 7 inches thick. The subsoil, about 43 inches thick, is strong brown and yellowish brown clay. Limestone bedrock is at a depth of 50 inches.

Typically, the Rock outcrop is limestone.

Included in mapping are small intermingled areas, generally less than 3 acres, of Chilhowie soils. These soils make up 5 percent of the map unit. Also included are small areas of severely eroded soils that have a surface layer of silty clay or clay.

Permeability is slow, and the available water capacity is moderate. Runoff is medium. Natural fertility is medium, and the organic matter content is low. The subsoil has a high shrink-swell potential. The root zone extends to bedrock, which is at a depth of about 32 inches in the Carbo soils and about 50 inches in the Endcav soils. The solum of the Carbo soils is commonly slightly acid to mildly alkaline. The solum of the Endcav soils is commonly strongly acid to neutral.

Most areas of these soils are in pasture. A few areas are in woodland.

The soils are not suited to cultivated crops. Rock outcrop is a major management concern on these soils. Other management concerns are the hazard of erosion, the need to increase the content of organic matter, and the need for lime and fertilizer.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer can help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees is moderately high for the Carbo soils and high for the Endcav soils. The soils are managed for pine and hardwood. Rock outcrop interferes with the use of timber equipment.

Depth to bedrock, Rock outcrop, slow permeability, high shrink-swell potential, and low strength are the main limitations for nonfarm uses. Depth to rock and slow permeability limit the use of the soils for septic tank absorption fields. Depth to rock is the dominant limitation for shallow excavations and for sanitary landfills. The high shrink-swell potential generally is the main limitation to the use of these soils as sites for dwellings. Low strength and high shrink-swell potential are limitations for local roads and streets.

The capability unit is VIIs.

8C—Cataska slaty silt loam, 7 to 15 percent slopes. This shallow, strongly sloping, well drained soil is on points and crests of ridges. Slopes are rough and complex and are about 200 to 1,000 feet long. About 35 percent of the surface area is covered by phyllite and slate fragments. Areas of this soil follow the mountain ranges and are long and winding. They range from 20 to 200 acres.

Typically, the surface layer of this soil is yellowish brown slaty silt loam about 4 inches thick. The subsoil, about 13 inches thick, is yellowish brown slaty and very slaty silt loam. The substratum is yellowish brown very flaggy silt loam. Hard phyllite is at a depth of about 35 inches.

Included with this soil in mapping are small intermingled areas, generally less than 5 acres, of Montalto soils. These soils make up 10 to 15 percent of this map unit.

Permeability of this Cataska soil is moderate, and the available water capacity is low. Surface runoff is medium. The soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 17 inches. Root growth is severely restricted by the large amount of hard fragments commonly at a depth of about 12 to 18 inches. The surface layer and the subsoil are commonly very strongly acid or strongly acid.

Most areas of this soil are in woodland. A few areas are in pasture.

This soil is not suited to cultivated crops, and it is poorly suited to pasture. It is droughty during the growing season. The hazard of erosion is severe and is a major management concern. Maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, and deferment of grazing help to maintain pasture.

The potential for trees on this soil is low. The soil is managed for pine and hardwood. The survival of seeds and seedlings is severely affected by droughtiness during the growing season. Logging roads and skid trails

should be laid out on the contour to reduce the concentration of runoff and thereby reduce erosion.

Shallowness to bedrock and slope are the main limitations for most nonfarm uses of this soil.

The capability subclass is VIIs.

8D—Cataska slaty silt loam, 15 to 25 percent slopes. This shallow, moderately steep, well drained soil is on points and crests of ridges. Slopes are rough and complex and are about 200 to 1,000 feet wide. About 35 percent of the surface area is covered by phyllite and slate fragments. Areas of this soil follow the mountain ranges and are long and winding. They range from 20 to 200 acres.

Typically, the surface layer of this soil is yellowish brown slaty silt loam about 4 inches thick. The subsoil, about 13 inches thick, is yellowish brown slaty and very slaty silt loam. The substratum is yellowish brown very flaggy silt loam. Hard phyllite is at a depth of about 35 inches.

Included with this soil in mapping are small intermingled areas, generally less than 5 acres, of Montalto soils. These soils make up 10 to 15 percent of this map unit.

Permeability of this soil is moderate, and the available water capacity is low. Surface runoff is rapid. The soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 17 inches. Root growth is severely restricted by the large amount of hard fragments commonly at a depth of about 12 to 18 inches. The surface layer and the subsoil are commonly very strongly acid or strongly acid.

Most areas of this soil are in woodland. A very few areas are in pasture.

This soil is not suited to cultivated crops, and it is poorly suited to pasture. The soil is droughty during the growing season. The hazard of erosion is severe and is a major management concern. Maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns also. Use of proper stocking rates, rotational grazing of pastures, and deferment of grazing can help to maintain pasture.

The potential for trees on this soil is low. The soil is managed for pine and hardwood. The survival of seeds and seedlings is severely affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope limits safe operation of heavy timber equipment.

Shallowness to bedrock and slope are the main limitations for most nonfarm uses of this soil.

The capability subclass is VIIs.

8E—Cataska slaty silt loam, 25 to 65 percent slopes. This shallow, steep and very steep, well drained soil is on ridges and side slopes. Slopes are rough and complex and are about 600 to 2,000 feet long. About 40 percent of the surface area is covered by phyllite and slate. Areas of this soil follow the mountain ranges and are long and winding. They range from 20 to 200 acres.

Typically, the surface layer of this soil is yellowish brown slaty silt loam about 3 inches thick. The subsoil, about 10 inches thick, is yellowish brown slaty and very slaty silt loam. The substratum is yellowish brown very flaggy silt loam. Hard phyllite is at a depth of about 30 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Myersville and Montalto soils. These soils make up 15 percent of this map unit.

Permeability of this Cataska soil is moderate, and the available water capacity is low. Surface runoff is rapid. The soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 17 inches. Root growth is severely restricted by the large amount of hard fragments at a depth of about 12 to 18 inches. The surface layer and the subsoil are commonly very strongly acid or strongly acid.

Most areas of this soil are in woodland.

This soil is not suited to cultivated crops or to pasture and hay crops. The soil is droughty during the growing season. The hazard of erosion is severe and is a major management concern.

The potential for trees on this soil is low. The soil is managed for pine and hardwood. The survival of seeds and seedlings is severely affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Shallowness to bedrock and slope are the main limitations for nonfarm uses of the soil.

The capability subclass is VIIs.

9—Chagrin fine sandy loam. This deep, nearly level, well drained soil is on broad, low-lying terraces of flood plains along the larger streams in the county. Areas of this soil are commonly elongated and follow the course of the adjacent stream. They range from 10 to over 100 acres.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil, about 21 inches thick, is dark yellowish brown fine sandy loam and loam. The substratum, which is between depths of 31 and 37 inches, is dark yellowish brown fine sandy loam. Below the substratum, to a depth of 66 inches or more, is a buried layer of dark grayish brown loam.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Craigsville, Buckton, and Newark soils. Also included are small spots of very gravelly and cobbly soils in

abandoned channels. These included soils make up about 5 percent of the map unit.

Permeability of this Chagrin soil is moderate, and the available water capacity is high. Tilth is good, but the soil is medium in natural fertility and low in organic matter content. The subsoil has a low shrink-swell potential. The root zone extends to a depth of about 60 inches. The surface layer and the upper part of the subsoil are commonly medium acid or slightly acid unless lime has been applied. The soil may be flooded for a very brief period 1 or 2 times a year.

Most areas of this soil are in cultivated crops. A few areas are in hay or woodland.

This soil is well suited to cultivated crops and to hay crops. The hazard of erosion is slight and is not a major management concern. The major management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer. Minimum tillage, use of cover crops, and including grasses and legumes in the cropping system increase the organic matter content and maintain the tilth of the soil. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and use of lime and fertilizer can help to maintain pasture.

The potential for trees on this soil is very high. The soil is managed mostly for hardwood. Seeds and seedlings survive and grow well in this soil.

Flooding is the main limitation for most nonfarm uses of this soil. Groundwater pollution is a hazard if this soil is used for septic tank absorption fields.

The capability subclass is IIw.

10C—Chester loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on ridgetops and side slopes. Slopes are smooth or slightly convex and are 200 to 1,000 feet long. Areas of this soil range from 3 to over 100 acres.

Typically, the surface layer of this soil is dark brown loam about 6 inches thick. The subsoil is yellowish brown, strong brown, and yellowish red loam and sandy clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is strong brown sandy loam.

Included with this soil in mapping are small areas of Manor, Myersville, and Montalto soils. These soils make up about 20 percent of this map unit.

Permeability of this Chester soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It is commonly very strongly acid or strongly acid throughout, but reaction in the surface layer and in the upper part of the subsoil varies because of local liming practices.

Most areas of this soil are in pasture (fig. 1) and hay crops. Some areas are cultivated, and a few are in woodland.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. The wooded areas of this soil are managed mostly for pine. Seeds and seedlings grow well if competing vegetation is controlled.

The slope is the main limitation for most nonfarm uses of this soil. The moderately permeable subsoil is the main limitation for septic tank absorption fields.

The capability subclass is IIIe.

10D—Chester loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on ridgetops and side slopes. Slopes are smooth or slightly convex and are 200 to 1,000 feet long. Areas of this soil range from 3 to over 100 acres.

Typically, the surface layer of this soil is dark brown loam about 6 inches thick. The subsoil is yellowish brown, strong brown, and yellowish red loam and sandy clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is strong brown sandy loam.

Included with this soil in mapping are small areas of Manor, Myersville, and Montalto soils. These soils make up about 20 percent of this map unit.

Permeability of this Chester soil is moderate, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It is commonly very strongly acid or strongly acid throughout, but reaction in the surface layer and in the upper part of the subsoil varies because of local liming practices.

Most areas of this soil are in pasture and hay crops. Some areas are cultivated, and a few are in woodland.

This soil is poorly suited to cultivated crops and is moderately well suited to pasture and hay crops. Crops respond well to lime and fertilizer. Minimum tillage, use

Figure 1.—This area of Chester loam, 7 to 15 percent slopes, is in tall fescue. The mixed hardwood forest in the background is on Chester-Manor very stony complex, 25 to 65 percent slopes.

of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. The wooded areas of this soil are managed mostly for pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

The slope, moderately permeable subsoil, and low strength are the main limitations for nonfarm uses of this soil. Slope limits this soil for use as a building site. Moderate permeability and slope limit use of the soil for sanitary landfills. Low strength and slope limit the soil as a source of material for roadfill and as a site for local roads and streets.

The capability subclass is VIe.

10E—Chester loam, 25 to 65 percent slopes. This deep, steep and very steep, well drained soil is on side slopes. Slopes are smooth or slightly convex and are

200 to 1,000 feet long. Areas of this soil range from 3 to over 100 acres.

Typically, the surface layer of this soil is dark brown loam about 4 inches thick. The subsoil is yellowish brown, strong brown, and yellowish red loam and sandy clay loam about 30 inches thick. The substratum to a depth of 60 inches or more is strong brown sandy loam.

Included with this soil in mapping are small areas of Manor, Myersville, and Montalto soils. These soils make up about 20 percent of this map unit.

Permeability of this Chester soil is moderate, and the available water capacity is moderate. Surface runoff is very rapid. The erosion hazard is severe. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It is commonly very strongly acid or strongly acid throughout.

Most areas of this soil are in woodland. A few areas are in pasture.

This soil is poorly suited to cultivated crops and moderately well suited to pasture and hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. The wooded areas of this soil are managed mostly for pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

The slope, moderately permeable subsoil, and low strength are the main limitations for nonfarm uses of this soil. Slope limits this soil for use as a building site. The moderately permeable subsoil and slope limit use of the soil for sanitary landfills. Low strength and slope limit the soil as a source of material for roadfill and as a site for local roads and streets.

The capability subclass is VIe.

11D—Chester-Manor very stony complex, 15 to 25 percent slopes. This map unit is made up of deep, moderately steep, well drained soils. These soils are so intermingled that it is not practical to separate them at the scale used in mapping. This map unit is on ridgetops, side slopes, and foothills of the Blue Ridge. Areas are irregularly shaped and range from about 30 to over 150 acres. Stones cover 3 to 15 percent of the surface.

Of the total mapped acreage, about 50 percent is Chester very stony loam, 30 percent is Mann very stony sandy loam, and 20 percent is other soils.

Typically, the surface layer of the Chester soil is dark brown very stony loam about 5 inches thick. The subsoil is mostly strong brown loam and sandy clay loam and is about 26 inches thick. The substratum to a depth of at least 60 inches is strong brown sandy loam.

Typically, the surface layer of the Manor soil is dark yellowish brown very stony sandy loam about 3 inches thick. The subsoil is mostly yellowish brown cobbly sandy loam and sandy loam and is about 28 inches thick. The substratum is mostly strong brown sandy loam to a depth of 49 inches, and from 49 to at least 60 inches it is strongly weathered rock.

Included in mapping are areas of soils formed in granodiorite material over soil material formed in greenstone material. Also included are small areas of moderately well drained and somewhat poorly drained soils.

Permeability is moderate in the Chester soil and moderately rapid in the Manor soil. Available water capacity is moderate. Surface runoff is moderately rapid. The surface layer of these soils is friable, but the very stony surface makes tillage impractical. The subsoil has low shrink-swell potential. The root zone extends to a depth of at least 60 inches. The soils are low in organic matter content and natural fertility, and they are commonly medium acid or strongly acid.

Most areas of these soils are in woodland. A few areas are in pasture.

These soils are not suited to cultivated crops and hay and are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer can help increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees is high for both the Chester soil and the Manor soil. The wooded areas of these soils are managed mostly for pine. Seeds and seedlings do fairly well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

The slope and large stones are the main limitations for nonfarm uses. Slope limits the use of the soils as a building site, as a site for sanitary landfills and roads, and as a site for septic tank absorption fields. Large stones limit the use of the soils as a source of topsoil.

The capability subclass is VIs.

11E—Chester-Manor very stony complex, 25 to 65 percent slopes. This map unit is made up of deep, steep and very steep, well drained soils. These soils are

so intermingled that it is not practical to separate them at the scale used in mapping. This map unit is on side slopes and foothills of the Blue Ridge. Areas are irregularly shaped and range from about 30 to over 150 acres. Stones cover 3 to 15 percent of the surface.

Of the total mapped acreage, about 45 percent is Chester very stony loam, 35 percent is Manor very stony sandy loam, and 20 percent is other soils.

Typically, the surface layer of the Chester soil is dark brown very stony loam about 5 inches thick. The subsoil is mostly strong brown loam and sandy clay loam about 26 inches thick. The substratum to a depth of at least 60 inches is strong brown sandy loam.

Typically, the surface layer of the Manor soil is dark yellowish brown very stony sandy loam about 3 inches thick. The subsoil is mostly yellowish brown cobbly sandy loam and sandy loam and is about 28 inches thick. The substratum to a depth of 49 inches is mostly strong brown sandy loam. From 49 to 60 inches is strongly weathered rock.

Included with these soils in mapping are areas of soils formed in granodiorite material over soil material formed in greenstone material. Also included are small areas of moderately well drained and somewhat poorly drained soils.

Permeability is moderate in the Chester soil and moderately rapid in the Manor soil. Available water capacity is moderate. Surface runoff is rapid. The subsoil has low shrink-swell potential. The root zone extends to a depth of at least 60 inches. The soils are low in organic matter content and natural fertility and are commonly medium acid to strongly acid.

Most areas of these soils are in woodland. A few areas are in pasture.

These soils are not suited to cultivated crops and hay, and they are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees is high for both the Chester soil and the Manor soil. The wooded areas of these soils are managed mostly for pine. Seeds and seedlings grow fairly well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope and large stones are the main limitations for nonfarm uses. Slope limits use of the soils as a building site and as a site for sanitary landfills, roads, and septic tank absorption fields. Large stones are the main limitations for use as a source of topsoil.

The capability subclass is VIIs.

12D—Chilhowie silty clay loam, rocky, 15 to 25 percent slopes. This moderately deep, moderately steep, well drained soil is on strong, convex side slopes of hills and ridges. Slopes are smooth to irregular and commonly complex, and they are about 300 to 500 feet long. Most areas are cut by shallow drainageways about 100 to 200 feet apart. Rock outcrops are about 100 to 300 feet apart and cover 0.1 to 1.0 percent of the surface. Areas of this soil generally follow the ridges and hilltops and are long and winding. They range from about 5 to 50 acres or more.

Typically, the surface layer of this soil is dark brown silty clay loam 3 inches thick. The subsoil is about 16 inches thick. The upper part of the subsoil is dark yellowish brown silty clay, and the lower part is strong brown clay. The substratum, from 19 to 23 inches, is strong brown very flaggy clay. Interbedded calcareous shale and limestone are at a depth of 23 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Carbo and Endcav soils. They make up about 10 percent of this map unit. Also included are small areas of Chilhowie soils that are moderately steep and steep, or are severely eroded, or have rock outcrops more than 300 feet apart. These make up about 15 percent of this map unit.

Permeability of this Chilhowie soil is slow, and the available water capacity is low. Runoff is rapid. Tilth is fair when the moisture content of the soil is optimum for tillage. The soil is high in natural fertility but low in organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of about 23 inches. The surface layer and the subsoil are commonly slightly acid or neutral. Bedrock is at a depth of about 2 feet.

Most areas of this soil are in pasture. Many areas are in woodland.

This soil is poorly suited to cultivated crops and moderately well suited to hay crops. It is droughty during growing periods. Rock outcrops interfere with haying operations. The hazard of erosion is very severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the use of fertilizer in keeping with hay and pasture needs.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, and deferment of grazing help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is moderate. The wooded areas of this soil are managed mostly for pine. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the crust-forming tendency of the silty clay loam surface

layer. Windthrow is a hazard because of restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The surface layer is soft and slippery when wet. Wetness and the slope of the soil limit safe operation of heavy timber equipment.

The moderate depth to bedrock and the steepness of slope are the main limitations for most nonfarm uses of this soil.

The capability subclass is VIs.

13B—Clearbrook shaly silt loam, 2 to 7 percent slopes. This moderately deep, gently sloping, somewhat poorly drained soil is primarily along stream heads and in broad upland depressions. Slopes are smooth or slightly concave or convex and about 100 to 600 feet long. Areas of this soil are commonly irregular in shape and parallel the drainageway. They range from 3 to more than 80 acres.

Typically, the surface layer is dark brown shaly silt loam about 6 inches thick. The subsoil to a depth of 10 inches is mottled, yellowish brown shaly silt loam. The lower part of the subsoil, from 10 to 26 inches, is a mottled, light brownish gray very shaly silty clay. The substratum from 26 to 38 inches is pale yellow and light olive gray very shaly silty clay. Light olive brown and grayish shale is at a depth of 38 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Berks, Weikert, and Sequoia soils. The included soils make up about 20 percent of this map unit.

Permeability of this Clearbrook soil is moderately slow. The available water capacity is moderate. Runoff is medium. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends below a depth of 26 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime has been applied.The seasonal high water table is at the surface or at a depth of 1/2 foot or less.

Most areas of this soil are in pasture or hay crops. A few areas are in cultivated crops or in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness. The soil is droughty during the growing season. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface layer, thereby reducing yields and increasing erosion.

The potential for trees on this soil is moderately high. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. They may be affected by droughtiness during long dry periods. During wet periods the soil is soft and will not support heavy timber equipment.

The seasonal high water table and the moderate depth to bedrock are the main limitations for most nonfarm uses of this soil. The high water table and the depth to bedrock limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and as a site for most recreation uses.

The capability subclass is IIIw.

13C—Clearbrook shaly silt loam, 7 to 15 percent slopes. This moderately deep, strongly sloping, somewhat poorly drained soil is primarily along stream heads and in broad upland depressions. Slopes are smooth or slightly concave or convex and about 100 to 600 feet long. Areas of this soil are commonly irregular in shape and parallel the drainageway. They range from 3 to more than 80 acres.

Typically, the surface layer is dark brown shaly silt loam about 6 inches thick. The subsoil to a depth of 10 inches is mottled, yellowish brown shaly silt loam. The lower part of the subsoil, from 10 to 26 inches, is a mottled, light brownish gray very shaly silty clay. The substratum, from 26 to 38 inches, is pale yellow and light olive gray very shaly silty clay. Light olive brown and grayish shale is at a depth of 38 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Berks, Weikert, and Sequoia soils. The included soils make up about 25 percent of this map unit.

Permeability of this soil is moderately slow. The available water capacity is moderate. Runoff is medium to rapid. Tilth is fair. The soil is medium in natural fertility and moderate in organic matter content. The subsoil has low shrink-swell potential. The root zone extends below a depth of 26 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are in pasture or hay crops. A few areas are in cultivated crops or in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness. The soil is droughty during the growing season. The moderate hazard of

erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil, thereby reducing yields and increasing erosion.

The potential for trees on this soil is moderately high. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. They may be affected by droughtiness during long dry periods. During wet periods the soil is soft and will not support heavy timber equipment.

The seasonal high water table and the moderate depth to bedrock are the main limitations for most nonfarm uses of the soil. The high water table and the depth to bedrock limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and as a site for most recreation uses.

The capability subclass is IIIw.

14—Craigsville cobbly sandy loam. This deep, nearly level to gently sloping, well drained soil is on flood plains and first bottoms. Areas are commonly elongated and follow the course of the adjacent stream. They range from 10 to more than 130 acres.

Typically, the surface layer of this soil is dark brown cobbly sandy loam about 3 inches thick. The subsoil, which is 37 inches thick, is a yellowish brown cobbly sandy loam and very cobbly sandy loam. The substratum to a depth of 60 inches or more is yellowish brown loamy sand and cobbly sandy loam.

Included with this soil in mapping are small areas of Millrock and Chagrin soils. These soils are on the same landscape positions as the Craigsville soil and make up about 15 percent of this map unit.

Permeability of the Craigsville soil is moderately rapid or rapid, and available water capacity is low. The surface layer is friable, but cobblestones may interfere with tillage. The erosion hazard is slight. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is commonly very strongly acid or strongly acid throughout, but reaction in the surface layer varies as a result of local liming practices. The soil is frequently flooded for brief periods during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed, and a few areas are in pasture.

This soil is poorly suited to cultivated crops and to pasture and hay. The cobblestones interfere with tillage. Some areas of this soil are covered frequently by flood water from the adjacent stream.

Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing and grazing when the soil is wet compact the surface soil and damage the stand of grasses and legumes.

The potential for trees, especially yellow-poplar, is high. The wooded areas of this soil are managed mostly for hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

Flooding is the main limitation for nonfarm uses, especially the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and as a site for most recreation uses.

The capability subclass is IIIs.

15E—Dekalb channery loam, 25 to 65 percent slopes. This moderately deep, steep and very steep, well drained soil is on ridgetops and side slopes of the foothills of the Blue Ridge. Areas of this soil are commonly irregularly rectangular. They are about 1,000 to 6,000 feet long and 600 to 4,000 feet wide. They range from about 50 to over 300 acres.

Typically, the surface layer of this soil is yellowish brown channery loam about 5 inches thick. The subsoil is mostly yellowish brown, very pale brown, and dark yellowish brown channery sandy loam and flaggy silt loam and is about 28 inches thick. The substratum, which extends to a depth of 39 inches, is light yellowish brown very channery loam. White sandstone bedrock is at 39 inches.

Included with this soil in mapping are small areas, generally less than 2 acres, of Cataska soils. Cataska soils are on the same landscape positions as the Dekalb soil. Also included are areas of Dekalb soils with slope of less than 25 percent. These included soils make up about 20 percent of this map unit.

Permeability of this Dekalb soil is moderately rapid, and the available water capacity is low. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable, but slope and small stones make tillage impractical. The subsoil has low shrink-swell potential. The root zone extends to bedrock. The soil is low in organic matter content and natural fertility and is strongly acid or very strongly acid throughout.

Nearly all the acreage of this soil is in woodland.

This soil is poorly suited to cultivated crops, pasture, and hay.

The potential for trees on this soil is moderately high on the south-facing slopes and high on the north-facing slopes. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope is the main limitation for nonfarm uses of this soil. Slope limits use of the soil as a building site, as a site for septic tank absorption fields, sanitary landfills, shallow excavations, and local roads and streets and as a source of roadfill.

The capability subclass is VIIe.

16F—Drall-Rubble land complex, 35 to 70 percent slopes. This map unit is made up of areas of deep, very steep, excessively drained soils and areas of stones that are virtually free of vegetation. These areas of Drall soils and areas of Rubble land are so intermingled that it is not practical to separate them at the scale used in mapping. Areas of this map unit are on side slopes of Massanutten Mountain. They are irregularly shaped and range from about 30 to more than 150 acres. Stones cover about 10 to 100 percent of the surface.

The map unit is about 50 percent Drall soils, 25 percent Rubble land, and 25 percent soils of minor extent.

Typically, the surface layer of the Drall soils is grayish brown very stony loamy sand about 4 inches thick. The subsoil is mostly light yellowish brown channery loamy sand about 18 inches thick. The substratum, from 22 to 42 inches, is light yellowish brown very channery loamy sand. Hard quartzite bedrock is at a depth of 42 inches.

Typically, the surface of Rubble land is mostly stones.

Included with this unit in mapping are small areas, generally less than 2 acres, of Cataska and Dekalb soils on the same landscape positions as Drall soils. Also included are areas where stones cover less than 10 percent of the surface and areas of Drall soils and Rubble land where the slope is less than 35 percent.

Permeability is rapid. Available water capacity is low. Surface runoff is rapid. The root zone extends to a depth of 40 inches. The soils are low in organic matter content and natural fertility. They are commonly very strongly acid or strongly acid.

In most areas of this unit the soils are in woodland use. The Rubble land supports essentially no vegetation.

The Drall soils are not suited to crops.

The potential for trees is moderate for the Drall soils on the south-facing slopes and moderately high on the north-facing slopes. It is very low for Rubble land. The survival of seeds and seedlings on the Drall soils is affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. Slope severely limits safe operation of heavy timber equipment.

Slope and large stones are the main limitations for most nonfarm uses.

The capability subclass is VIIs.

17B—Dyke loam, 2 to 7 percent slopes. This deep, gently sloping, well drained soil is on terraces along larger streams. Areas of this soil are irregularly shaped. They range from 5 to over 100 acres.

Typically, the surface layer of this soil is dark reddish brown loam about 9 inches thick. The upper part of the subsoil is dark red clay about 35 inches thick. The lower part of the subsoil to a depth of 60 inches or more is dark red cobbly silty clay loam.

Included with this soil in mapping are Unison, Montalto, and Myersville soils. These soils make up about 15 percent of this map unit.

Permeability of this Dyke soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but clods form if the soil is tilled when too wet or too dry. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is commonly strongly acid or very strongly acid througout unless limed.

Most areas of this soil are in nonfarm use. A few areas are in cultivated crops.

This soil is well suited to cultivated crops and to hay. Crops respond well to lime and fertilizer. Terracing, minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, moderate permeability, and the clayey subsoil are the main limitations for nonfarm uses of the soil. Low strength and the clayey subsoil limit use of the soil as a building site. The clayey subsoil is the main limitation for trench type sanitary landfills. The moderate

permeability limits the use of this soil as septic tank absorption fields.

The capability subclass is IIe.

17C—Dyke loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on terraces along the larger streams. Areas of this soil are irregularly shaped. They range from 30 to over 300 acres.

Typically, the surface layer of this soil is dark reddish brown loam about 5 inches thick. The upper part of the subsoil is dark red clay about 35 inches thick. The lower part to a depth of 60 inches or more is dark red cobbly silty clay loam.

Included with this soil in mapping are Unison, Montalto, and Myersville soils. These soils make up about 15 percent of this map unit.

Permeability of this Dyke soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is easily tilled when moist, but clods form if the soil is tilled when wet or dry. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is commonly strongly acid or very strongly acid througout unless limed.

Most areas of this soil are in nonfarm use. A few areas are in cultivated crops.

This soil is moderately well suited to cultivated crops and to hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to increase the organic matter content, maintain tilth, reduce crusting, increase water infiltration, and control erosion.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface layer and thereby increases runoff and erosion.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby reduce erosion.

The low strength, moderate permeability, slope, and clayey subsoil are the main limitations for nonfarm uses of this soil.The low strength, slope, and clayey subsoil limit use of the soil as a building site. The clayey subsoil limits the use of this soil for trench type sanitary landfills. The moderate permeability and the slope limit the use of this soil as septic tank absorption fields.

The capability subclass is IIIe.

18B—Endcav silt loam, 2 to 7 percent slopes. This deep, well drained, gently sloping soil is on the smoother slopes in the limestone valley. Slopes are commonly complex. Areas of this soil are irregularly shaped and cover 3 to 100 acres or more.

The surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil is 43 inches thick. The upper 8 inches of the subsoil is strong brown clay, and the lower 35 inches is yellowish brown and strong brown clay.

Included with this soil in mapping are Lodi and Carbo soils. Also included are some areas of Rock outcrop. These inclusions make up about 10 percent of this map unit.

Permeability of this Endcav soil is moderately slow, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if tilled when too wet or too dry. The subsoil has high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. The surface layer is commonly medium acid unless limed, and the subsoil is commonly medium acid to mildly alkaline.

Most areas of this soil are in cultivated crops and pasture. A few areas are in woodland.

This soil is well suited to cultivated crops and to hay. Tilth can be maintained or improved by incorporating organic material into the soil and by plowing when the moisture content of the soil is optimum for tillage. In cultivated areas, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping help to reduce runoff, reduce crusting, increase water infiltration, and control erosion. Crops respond to applications of lime and fertilizer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer help to maintain pasture.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The moderately slow permeability, low strength, high shrink-swell potential, and clayey subsoil are the main limitations for nonfarm uses. The moderately slow permeability limits the use of this soil for septic tank absorption fields. Low strength and high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential limits the use of this soil as a site for dwellings. Depth to rock

and the clayey subsoil limit the use of this soil for trench sanitary landfills and daily cover for landfill.

The capability subclass is IIe.

18C—Endcav silt loam, 7 to 15 percent slopes. This deep, well drained, strongly sloping soil is on the smoother slopes in the limestone valley. Slopes are commonly complex. Areas of this soil are irregularly shaped and cover 3 to 100 acres or more.

The surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil is 43 inches thick. The upper 8 inches of the subsoil is strong brown clay. The lower 35 inches is yellowish brown and strong brown clay.

Included with this soil in mapping are Lodi and Carbo soils. Also included are some areas of Rock outcrop and areas of soils that have slopes steeper than 15 percent. The inclusions make up about 25 percent of this map unit.

Permeability of this Endcav soil is moderately slow, and the available water capacity is moderate. Surface runoff is moderately rapid. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if tilled when too wet or too dry. The subsoil has high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. Commonly, the surface layer is medium acid unless limed, and the subsoil is medium acid to mildly alkaline.

Most areas of this soil are in cultivated crops and pasture. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay. Tilth can be maintained and improved by incorporating organic material into the soil and by plowing when the moisture content of the soil is optimum for tillage. In cultivated areas, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping help to reduce runoff, reduce crusting, increase water infiltration, and control erosion. Crops will respond to applications of lime and fertilizer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer help to maintain pasture.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The moderately slow permeability, low strength, high shrink-swell potential, and clayey subsoil are the main limitations for nonfarm uses. The moderately slow permeability limits the use of this soil for septic tank absorption fields. Low strength and high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential limits the use of this soil as a site for dwellings. Depth to rock and the clayey subsoil limit the use of this soil for trench type sanitary landfills.

The capability subclass is IIIe.

19B—Hawksbill cobbly loam, 2 to 7 percent slopes. This deep, gently sloping, well drained soil is on terraces and colluvial fans. Slopes are smooth and are 200 to 1,000 feet long. Areas of this soil are commonly long and winding. They range from 5 to about 230 acres.

Typically, the surface layer of this soil is dark brown cobbly loam about 6 inches thick. The subsoil is dark yellowish brown or brown gravelly clay loam or gravelly loam about 19 inches thick. The substratum to a depth of 60 inches or more is brown very cobbly clay loam.

Included with this soil in mapping are small areas, generally less than 3 acres, of Purdy soils. These soils are on terraces. They make up about 5 percent of this map unit. Also included are small areas of soils that have a surface layer of very gravelly loam and very cobbly loam. These soils make up about 10 percent of this map unit.

Permeability of this Hawksbill soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is slight. The surface layer is friable, and small stones interfere with tillage. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and high in natural fertility. It is commonly medium acid to neutral throughout, but reaction in the surface layer varies because of local liming practices. This soil is occasionally flooded for very brief periods.

Most areas of this soil are in pasture crops. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

Flooding, small stones, and seepage are the main limitations for nonfarm uses. Flooding limits use of the soil as a site for local roads and streets, septic tank absorption fields, and sewage lagoons. Small stones limit use of the soil as a site for excavations and recreation areas. Seepage limits the soil as a site for trench type sanitary landfills.

The capability subclass is IIIs.

20B—Hawksbill very cobbly loam, 2 to 7 percent slopes. This deep, gently sloping, well drained soil is on terraces and colluvial fans in and near the Blue Ridge. Areas of this soil are long and narrow. Slopes are smooth and are 200 to 1,000 feet long. They range from 5 to more than 50 acres.

Typically, the surface layer of this soil is dark brown very cobbly loam about 6 inches thick. The subsoil is dark yellowish brown or brown gravelly clay loam or gravelly loam about 19 inches thick. The substratum to a depth of 60 inches or more is mostly brown very cobbly clay loam.

Included with this soil in mapping are areas, generally less than 3 acres, of Purdy and Craigsville soils. Also included are areas of similar soils that contain fewer cobblestones in the surface layer. These included soils make up about 10 percent of this map unit.

Permeability of this Hawksbill soil is moderate, and the available water capacity is low. Surface runoff is medium. The erosion hazard is slight. The surface layer is friable, but cobblestones interfere with tillage. The root zone extends to a depth of 60 inches or more. The soil is

Figure 2.—Unimproved pasture of tall fescue in an area of Hawksbill very cobbly loam, 2 to 7 percent slopes. In the background is a mixed hardwood and conifer forest on Chester-Manor very stony complex, 25 to 65 percent slopes.

medium in organic matter content and high in natural fertility. It is commonly medium acid to neutral throughout. This soil is occasionally flooded for very brief periods.

Most areas of this soil are in woodland. A few areas are in pasture (fig. 2) or cultivated crops.

This soil is poorly suited to cultivated crops and to hay crops. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

The flood hazard and cobblestone content are the main limitations for nonfarm uses. The flood hazard limits the use of this soil as a site for septic tank absorption fields, sewage lagoons, dwellings with or without basements, and sanitary landfills. Cobblestones limit shallow excavations and most recreation uses.

The capability subclass is IVs.

20C—Hawksbill very cobbly loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on terraces and colluvial fans in and near the Blue Ridge. Areas of this soil are long and narrow. Slopes are smooth and are 200 to 500 feet wide. They range from 3 to more than 80 acres.

Typically, the surface layer of this soil is dark brown very cobbly loam about 6 inches thick. The subsoil is dark yellowish brown or brown gravelly clay loam or gravelly loam about 19 inches thick. The substratum to a depth of 60 inches or more is mostly brown very cobbly clay loam.

Included with this soil in mapping are areas, generally less than 3 acres, of Lew, Montalto, and Myersville soils. Also included are areas of similar soils that contain fewer cobblestones in the surface layer. These included soils make up about 10 percent of this map unit.

Permeability of this Hawksbill soil is moderate, and the available water capacity is low. Surface runoff is medium. The erosion hazard is slight. The surface layer is friable, but cobblestones interfere with tillage. The root zone extends to a depth of 60 inches or more. The soil is medium in organic matter content and high in natural fertility. It is commonly medium acid to neutral throughout. This soil is occasionally flooded for very brief periods.

Most areas of this soil are in woodland. A few areas are in pasture or cultivated crops.

This soil is poorly suited to cultivated crops and to hay crops. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and will not support heavy timber equipment.

The flood hazard, slope, and cobblestones are the main limitations for nonfarm uses. The flood hazard and slope limit the use of this soil for septic tank absorption fields, sewage lagoons, dwellings with or without basements, and sanitary landfills. Cobblestones limit shallow excavations and most recreation uses.

The capability subclass is IVs.

21D—Lew channery loam, 7 to 25 percent slopes. This deep, strongly sloping and moderately steep, well drained soil is on side slopes in the Blue Ridge. Slopes are slightly elongated and 300 to 1,500 feet long. Areas of this soil are commonly long and winding and range from 5 to more than 30 acres.

Typically, the surface layer of this soil is very dark grayish brown channery loam about 8 inches thick. The subsoil to a depth of about 40 inches is dark yellowish brown and brown channery loam, flaggy clay loam, and channery sandy clay loam. The lower part of the subsoil and the substratum to a depth of 60 inches or more are yellowish brown channery sandy loam.

Included with this soil in mapping are areas, generally less than 3 acres, of Catoctin, Montalto, and Myersville soils. These included soils make up about 15 percent of this map unit.

Permeability of this Lew soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable, but tillage is impractical because of stones. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and medium in natural fertility. It is commonly very strongly acid to medium acid throughout. The surface layer varies in reaction as a result of local liming practices.

Most areas of this soil are in woodland. A few areas are in pasture.

This soil is poorly suited to cultivated crops and to pasture. Pasture responds well to lime and fertilizer. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, and deferred grazing help to increase the carrying capacity of pasture and to control erosion. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is high. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the soil is soft and will not support heavy timber equipment.

The steepness of slope and the stones are the main limitations for nonfarm uses of this soil.

The capability subclass is VIs.

22E—Lew very stony loam, 25 to 65 percent slopes. This deep, steep and very steep, well drained soil is on side slopes in the Blue Ridge. Slopes are slightly elongated and 300 to 1,500 feet long. Areas of this soil are commonly long and winding and range from 5 to more than 300 acres.

Typically, the surface layer of this soil is very dark grayish brown very stony loam about 2 inches thick. The subsoil to a depth of about 40 inches is mostly dark yellowish brown and brown channery loam, flaggy clay loam, and channery sandy clay loam. The lower part of the subsoil and the substratum to a depth of 60 inches or more are yellowish brown channery sandy loam.

Included with this soil in mapping are areas, generally less than 3 acres, of Catoctin, Montalto, and Myersville soils. These included soils make up about 10 percent of this map unit.

Permeability of this Lew soil is moderate, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable, but tillage is impractical because of stones. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and medium in natural fertility. It is commonly very strongly acid to medium acid throughout. The surface layer varies in reaction as a result of local liming practices.

Most areas of this soil are in woodland.

This soil is not suited to use as cultivated cropland and is poorly suited to use as pasture. The stones on the surface and the slope are limitations to those uses.

The potential for trees on this soil is high. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the soil is soft and will not support heavy timber equipment.

The steepness of slope and the stones are the main limitations for nonfarm uses of this soil.

The capability subclass is VIIe.

23B—Lodi silt loam, 2 to 7 percent slopes. This deep, well drained, gently sloping soil is on narrow to broad, gently convex side slopes. The slopes are smooth and complex and commonly 100 to 500 feet long. In most areas this soil follows the strike of the limestone bedrock. Areas are commonly long and narrow. They range from 3 to over 80 acres.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium from the surrounding uplands. Also included are areas of soils that are shallower than 60 inches to rippable bedrock, areas of soils that have a sandy loam surface layer, and small areas of soils containing over 15 percent chert fragments. The included soils make up about 25 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Tilth is good. Runoff is medium. The soil is medium in natural fertility and low in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid unless limed. The root zone extends to a depth of about 60 inches. Bedrock is at a depth of more than 60 inches. The subsoil has moderate shrink-swell potential.

Most areas of this soil are in cultivated crops. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture crops. The erosion hazard is slight. Tilth can be maintained by incorporating organic material into the soil and by plowing when the moisture content of the soil is optimum for tillage. Crops respond to applications of lime and fertilizer. In cultivated areas, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, terracing, contour tillage, and contour stripcropping can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer to offset the acidity and raise the fertility of the soil can help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. This soil is managed for both hardwood and pine. Seeds and seedlings survive and grow well if the competing

vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The clayey subsoil, moderate permeability, and low strength, and the shrink-swell potential of the subsoil, are the main limitations for nonfarm uses. The moderate permeability and clayey subsoil limit the use of this soil for septic tank absoprtion fields, sewage lagoons, and trench type sanitary landfills. The moderate shrink-swell potential limits the use of this soil as a site for dwellings. Low strength limits the use of this soil for roadfill and for local roads and streets.

The capability subclass is IIe.

23C—Lodi silt loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on narrow to broad, convex side slopes in the limestone valley. Slopes are smooth and commonly complex and are about 100 to 300 feet long. They range from 5 to 100 acres.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium from the surrounding uplands. Other inclusions are areas of soils that are shallower than 60 inches to rippable bedrock, areas of soils that have a sandy loam surface layer, and small areas of soils that contain more than 15 percent chert fragments. The included soils make up about 25 percent of this map unit.

Permeability is moderate, and the available water capacity is moderate. Runoff is medium. Tilth is good, and the soil is medium in natural fertility and low in organic matter content. The subsoil has low to moderate shrink-swell potential. The root zone extends to a depth of approximately 60 inches. The surface layer and the subsoil are very strongly acid unless limed. Bedrock is at a depth of 60 inches or more.

Most areas of this soil are in cultivated crops or pasture. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. The hazard of erosion is moderate to severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset acidity and to raise the fertility of the soil. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help reduce runoff and thereby control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. This soil is managed for both hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The clayey subsoil, moderate permeability, low strength, slope, and moderate shrink-swell potential are the main limitations for nonfarm uses. The moderate permeability and the clayey subsoil limit the use of this soil for septic tank absorption fields and trench type sanitary landfills. Slope limits the use of this soil for sewage lagoons. The shrink-swell potential and slope limit its use for dwellings. Low strength limits the use of this soil for roadfill and for local roads and streets.

The capability subclass is IIIe.

23D—Lodi silt loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on narrow to broad convex side slopes in the limestone valley. Slopes are smooth and commonly complex and are about 100 to 300 feet long. They range from 5 to 40 acres.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil, about 36 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium eroded from the surrounding uplands. Also included are areas of soils that have a sandy loam surface layer. The included soils make up about 15 percent of this map unit.

Permeability is moderate in this Lodi soil, and the available water capacity is moderate. Runoff is medium. Tilth is good, and the soil is medium in natural fertility and low in organic matter content. The subsoil has low to moderate shrink-swell potential. The root zone extends to a depth of approximately 60 inches. The surface layer and the subsoil are very strongly acid or strongly acid unless limed. Bedrock is at a depth of 60 inches or more.

Most areas of this soil are in pasture or orchards. A few areas are in hay crops or in woodland.

This soil is poorly suited to use as cultivated cropland and is moderately well suited to use as hayland. Steepness of slope is a limitation to those uses. The hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the content of organic matter in the soil and the need for lime and fertilizer to offset acidity and to raise the fertility of the soil. If this soil is cultivated, minimum tillage, use of cover crops, and including grasses and

legumes in the cropping system help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. The soil is managed for both pine and hardwood. Seeds and seedlings grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

The slope, low strength, and clayey subsoil are the main limitations for nonfarm uses. The slope and the clayey subsoil limit the use of the soil for septic tank absorption fields, sanitary landfills, and roads. Slope is the main limitation for construction of buildings. Low strength limits the use of this soil for roadfill and for local roads and streets.

The capability subclass is IVe.

24B—Lodi silt loam, rocky, 2 to 7 percent slopes. This deep, well drained, gently sloping soil is in the limestone valley. Limestone outcrops make up 0.1 to 1.0 percent of the surface area and are about 100 to 300 feet apart. Slopes are smooth, complex, and about 100 to 400 feet long. Areas of this soil are irregularly shaped and range from 3 to about 40 acres.

The surface layer is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium eroded from the surrounding uplands. Also included are areas of soils that have a sandy loam surface layer. The included soils make up about 15 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Runoff is medium. Rock outcrops interfere with tillage but do not make it impractical. The soil is medium in natural fertility and low in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil has been limed. The root zone extends to a depth of about 60 inches. Bedrock is at a depth of more than 60 inches, except near the rock outcrops. The subsoil has moderate shrink-swell potential.

Most areas of this soil are in hay crops, pasture, or orchards. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and is well suited to hay crops. The moderate erosion hazard is a major management concern. Tilth is fair. Crops will respond to applications of lime and fertilizer. If this soil is cultivated, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer to offset the acidity and increase the fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. This soil is managed for both hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The moderate permeability, clayey subsoil, low strength, shrink-swell potential, and Rock outcrop are the main limitations for nonfarm uses. The clayey subsoil, moderate permeability, and rock outcrops limit the use of this soil for septic tank absorption fields, sewage lagoons, and trench type sanitary landfills. The shrink-swell potential and rock outcrops limit the use of this soil for dwellings. Low strength and rock outcrops limit the use of this soil for roadfill and local roads and streets.

The capability subclass is IIe.

24C—Lodi silt loam, rocky, 7 to 15 percent slopes. This deep, well drained, strongly sloping soil is in the limestone valley. Limestone outcrops make up 0.1 to 1.0 percent of the surface area and are about 100 to 300 feet apart. Slopes are smooth, complex, and about 100 to 400 feet long. Areas of this soil are irregularly shaped and range from 3 to about 60 acres.

The surface layer is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium eroded from the surrounding uplands. Also included are areas of soils that have a sandy loam surface layer. The included soils make up about 20 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Runoff is medium. Rock outcrops interfere with tillage but do not make it impractical. The soil is medium in natural fertility and low

in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil has been limed. The root zone extends to a depth of about 60 inches. Bedrock is at a depth of more than 60 inches, except near the outcrops. The subsoil has moderate shrink-swell potential.

Most areas of this soil are in pasture or hay crops. A few areas are in orchards or woodland.

This soil is moderately well suited to cultivated crops and to hay crops. The moderate erosion hazard is a major management concern. Tilth is fair. Crops will respond to applications of lime and fertilizer. If this soil is cultivated, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer to offset the acidity and raise the fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. This soil is managed for both hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The slope, moderate permeability, clayey subsoil, low strength, and shrink-swell potential are the main limitations for nonfarm uses. The slope, clayey subsoil, and moderate permeability limit the use of this soil for septic tank absorption fields, sewage lagoons, and trench type sanitary landfills. The shrink-swell potential limits the use of this soil for dwellings. Low strength limits the use of this soil for roadfill and local roads and streets.

The capability subclass is IIIe.

24D—Lodi silt loam, rocky, 15 to 25 percent slopes. This deep, well drained, moderately steep soil is in the limestone valley. Limestone outcrops make up 0.1 to 1.0 percent of the surface area and are about 100 to 300 feet apart. Slopes are smooth, complex, and about 100 to 400 feet long. Areas of this soil are irregularly shaped and range from 5 to about 60 acres.

The surface layer is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are areas, generally less than 3 acres, of soils that have a coarser textured subsoil. These soils are in drainageways and formed in colluvium and alluvium eroded from the surrounding uplands. Also included are areas of soils that have a sandy loam surface layer. The included soils make up about 10 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Runoff is moderately rapid. Rock outcrops interfere with tillage but do not make it impractical. The soil is medium in natural fertility and low in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil has been limed. The root zone extends to a depth of about 60 inches. Bedrock is at a depth of more than 60 inches, except near the outcrops. The subsoil has moderate shrink-swell potential.

Most areas of this soil are in pasture or orchards. A few areas are in hay crops or woodland.

This soil is poorly suited to cultivated crops and is moderately well suited to hay crops. The erosion hazard is severe and is a major management concern. Tilth is fair. Crops will respond to applications of lime and fertilizer. If this soil is cultivated, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, weed control, and the use of lime and fertilizer to offset the acidity and raise the fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. This soil is managed for both hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The slope, moderate permeability, clayey subsoil, low strength, and moderate shrink-swell potential of the subsoil are the main limitations for nonfarm uses. The slope, clayey subsoil, and moderate permeability limit the use of this soil for septic tank absorption fields, sewage lagoons, and trench type sanitary landfills. The shrink-swell potential limits the use of this soil for dwellings. Low strength limits the use of this soil for roadfill and local roads and streets.

The capability subclass is IVe.

25C—Lodi silt loam, very rocky, 7 to 15 percent slopes. This deep, well drained, strongly sloping soil is in the limestone valley. Limestone outcrops make up 1 to 10 percent of the surface and are about 30 to 100 feet apart. Slopes are mostly complex. Areas of this soil are

about 100 to 300 feet long and irregularly shaped and range from 3 to 30 acres.

Typically, the surface layer is dark brown silt loam 6 inches thick. The subsoil, 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are intermingled areas, generally less than 3 acres, of soils in drainageways. These soils formed in colluvium and alluvium eroded from the surrounding uplands and have a coarser textured subsoil than the Lodi soil. They make up about 20 percent of this map unit. Also included are areas of soils that have a sandy loam surface layer and areas of soils, near the rock outcrops, that are less than 60 inches deep to bedrock. These included soils make up about 10 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Runoff is medium. The soil is medium in natural fertility and low in organic matter content, but rock outcrops make tillage impractical. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil is limed. The root zone extends to a depth of about 60 inches. The subsoil has moderate shrink-swell potential.

Most areas of this soil are in woodland use. A few areas are used for pasture and some are in orchards.

This soil is poorly suited to cultivated crops and is moderately well suited to hay crops. The erosion hazard is moderate and is a major management concern. Tilth is fair, but the soil is difficult to plow because of rocks. Crops will respond to applications of lime and fertilizer. If this soil is cultivated, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The softness and slipperiness of this soil when it is wet and the slope limit the safe operation of heavy timber equipment.

The rock outcrops limit most nonfarm uses of this soil.

The capability subclass is VIs.

25D—Lodi silt loam, very rocky, 15 to 25 percent slopes. This deep, well drained, moderately steep soil is on uplands in the limestone valley. Limestone outcrops make up 1 to 10 percent of the surface and are about 30 to 100 feet apart. Slopes are mostly complex. Areas of this soil are about 100 to 300 feet long and irregularly shaped and range from 3 to 25 acres.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil, about 36 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Included with this soil in mapping are intermingled areas, less than 3 acres, of soils in drainageways that formed in colluvium and alluvium eroded from the surrounding uplands. These soils have a coarser textured subsoil than the Lodi soil. They make up about 15 percent of this map unit. Also included are areas of soils that have a sandy loam surface layer and areas of soils, near the rock outcrops, that are less than 60 inches deep to bedrock. These included soils make up about 10 percent of this map unit.

Permeability of this Lodi soil is moderate, and the available water capacity is moderate. Runoff is medium. The soil is medium in natural fertility and low in organic matter content. Rock outcrops make tillage impractical. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil is limed. The root zone extends to a depth of about 60 inches. The subsoil has moderate shrink-swell potential.

Most areas of soil are in woodland. A few areas are used for pasture or cultivated crops.

This soil is not suited to cultivated crops, and it is poorly suited to hay crops. The erosion hazard is severe and is a major management concern. Tilth is fair, but the soil is difficult to plow because of the rocks. Crops will respond to applications of lime and fertilizer. If this soil is cultivated, minimum tillage, stubble mulching, use of cover crops, use of grasses and legumes in the cropping system, contour tillage, and contour stripcropping help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The softness and slipperiness of the soil when it is wet and the slope limit safe operation of heavy timber equipment.

The steepness of slope and the rock outcrop are the main limitations for most nonfarm uses of this soil.

The capability subclass is VIs.

26C—Lodi-Rock outcrop complex, 2 to 15 percent slopes. This map unit is made up of deep, gently sloping to strongly sloping, well drained soils and limestone Rock outcrop that are so intermingled that it is not practical to separate them at the scale used in mapping. Slopes are complex. Areas of this map unit are irregularly shaped, and they range from 3 to 40 acres.

Of the total acreage of this map unit, about 50 percent is Lodi soils and 30 percent is Rock outcrop. Soils of minor extent make up the rest.

Typically, the surface layer of the Lodi soils is dark brown silt loam about 6 inches thick. The subsoil, about 35 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Rock outcrop typically is limestone, which juts through 10 to 50 percent of the surface area.

Included in mapping are areas, less than 3 acres, of soils in drainageways. These soils formed in colluvium and alluvium eroded from the surrounding uplands. They have a coarser textured subsoil than the Lodi soils. They make up about 15 percent of this map unit. Also included are areas of soils that have a sandy loam surface layer and areas of soils that are shallower than 60 inches to limestone bedrock. These soils make up about 10 percent of this map unit.

Permeability of the Lodi soils is moderate, and the available water capacity is moderate. Runoff is medium. Tilth is poor. The soils are medium in natural fertility and low in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid unless the soil is limed. The root zone extends to a depth of about 60 inches. The soils are deeper than 60 inches over bedrock. The subsoil has moderate shrink-swell potential.

Most of the acreage of this map unit is in woodland. Some is in pasture.

This complex is poorly suited to use as pasture and is not suited to use as cropland. Rock outcrop is the main limitation to these uses.

The potential for trees is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby reduce erosion. The softness and slipperiness of the surface layer when it is wet, the Rock outcrop, and the slope of the soils limit safe operation of heavy timber equipment.

Rock outcrop is the main limitation for most nonfarm uses.

The capability subclass is VIIs.

26E—Lodi-Rock outcrop complex, 15 to 45 percent slopes. This map unit consists of deep, moderately steep to steep, well drained soils and limestone Rock outcrop that are so intermingled that it is not practical to separate them at the scale used in mapping. Slopes are complex. Areas of this soil are irregularly shaped and range from 3 to 150 acres.

Of the total mapped acreage, about 50 percent is Lodi soils and 30 percent is Rock outcrop. Included soils make up the rest.

Typically, the surface layer of the Lodi soils is dark brown silt loam about 5 inches thick. The subsoil, about 36 inches thick, is yellowish red clay. The substratum to a depth of 60 inches or more is multicolored clay.

Typically, Rock outcrop is limestone jutting through 10 to 50 percent of the surface area.

Included in mapping are areas, generally less than 3 acres, of soils in drainageways. These soils formed in colluvium and alluvium eroded from the surrounding uplands. They have a coarser textured subsoil than the Lodi soils, and they make up about 15 percent of this map unit. Also included are areas of soils that have a sandy loam surface layer and areas of soils that are shallower than 60 inches to limestone bedrock. They make up about 10 percent of this map unit.

Permeability of the Lodi soils is moderate, and the available water capacity is moderate. Runoff is medium. The tilth is poor. The soils are medium in natural fertility and low in organic matter content. The surface layer and the subsoil are very strongly acid or strongly acid. The root zone extends to a depth of about 60 inches. Bedrock is at a depth of more than 60 inches. The subsoil has moderate shrink-swell potential.

Most of the acreage of this map unit is in woodland.

The soils in this map unit are not suited to crops. Rock outcrop and slope interfere with tillage.

The potential for trees is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The softness and slipperiness of the surface layer when it is wet, the Rock outcrop, and the slope of the soils limit safe operation of heavy timber equipment.

Rock outcrop and slope are the main limitations for most nonfarm uses.

The capability subclass is VIIs.

27B—Millrock loamy fine sand, 0 to 7 percent slopes. This deep, level to gently sloping, well drained soil is on flood plains. Areas of this soil are commonly elongated and follow the course of the adjacent stream. They are 5 to 50 acres.

Typically, the surface layer is dark brown loamy fine sand about 12 inches thick. The subsoil, from 12 to 43 inches, is mostly dark yellowish brown and light yellowish brown loamy sand. The substratum from 43 to at least 60 inches is light yellowish brown loamy sand.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Chagrin and Buckton soils. These included soils make up about 5 percent of the map unit.

Permeability of this Millrock soil is rapid, and the available water capacity is low. Runoff is slow to medium. Tilth is good, but the soil is low in natural fertility and organic matter content. The substratum has low shrink-swell potential. The root zone extends to a depth of about 60 inches. The surface layer and the subsoil are slightly acid or neutral. The soil is frequently flooded for very brief periods during most seasons.

Most areas of this soil are in woodland. A few areas are in pasture or hay crops (fig. 3).

This soil is moderately well suited to cultivated crops and to hay crops. The hazard of erosion is slight and is not a major management concern. This soil is droughty during dry periods. Fertilizer is needed to offset the low natural fertility of the soil. Minimum tillage, use of cover crops, and including grasses and legumes in the cropping system help to increase the organic matter content. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture.

The potential for trees on this soil is high. The soil is managed for hardwood and pine. The survival of seeds and seedlings is affected by droughtiness during the growing season.

Flooding and the hazard of seepage are the main limitations for nonfarm uses of this soil. Flooding and seepage limit the use of this soil for septic tank absorption fields, sewage lagoons, and sanitary landfills. Flooding limits the use of this soil as a site for dwellings and most recreation uses.

The capability subclass is IIIs.

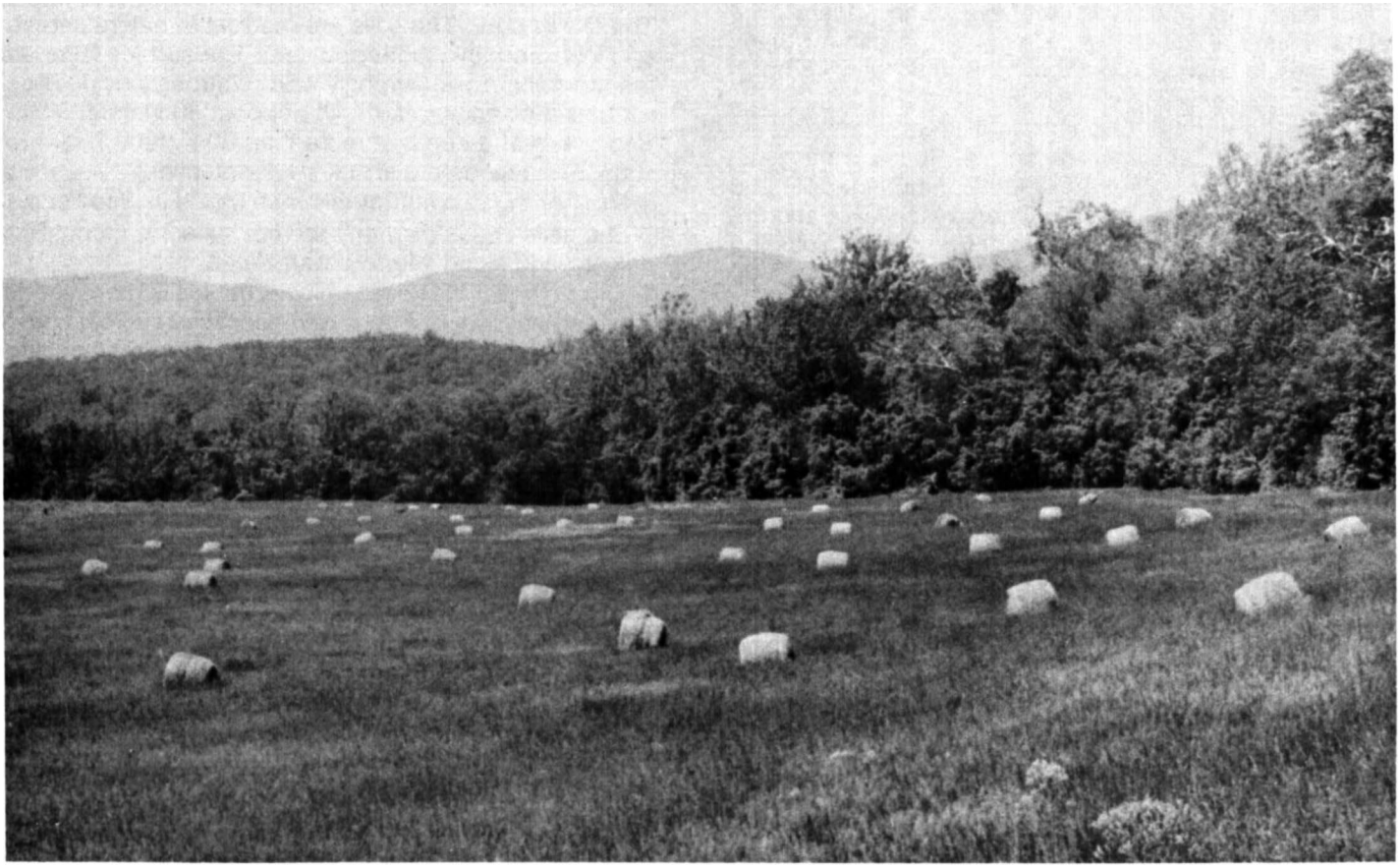


Figure 3.—Tall fescue hay in an area of Millrock loamy fine sand, 0 to 7 percent slopes.

28B—Monongahela loam, 2 to 7 percent slopes. This deep, gently sloping, moderately well drained soil is on broad terraces along the rivers and major streams. Slopes are smooth and are about 200 to 800 feet wide. Areas of this soil are commonly irregular in shape but parallel the course of the adjacent stream. They range from 3 to more than 100 acres.

Typically, the surface layer is brown loam about 11 inches thick. The subsoil extends to a depth of about 53 inches. To a depth of 24 inches it is yellowish brown silt loam and, in the lower part, clay loam. Between depths of 24 and 53 inches it is a fragipan of yellowish brown and strong brown clay loam that has light gray and light brownish gray mottles. The substratum to a depth of 60 inches is a mixture of strong brown and brownish yellow clay loam.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Chagrin, Purdy, and Berks soils. These soils make up 15 percent of this map unit.

Permeability of this Monongahela soil is moderate above the fragipan and moderately slow or slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. Tilth is good, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 24 inches. Root growth is severely restricted by the fragipan, which is commonly at a depth of about 20 to 30 inches. The surface layer and the subsoil are commonly strongly acid or very strongly acid unless lime has been applied. The seasonal high water table is at a depth of 1 1/2 to 3 feet.

Most areas of this soil are in woodland. A few areas are in pasture (fig. 4) or hay crops.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness and the restricted root zone. The soil is droughty during the growing season. The hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees on this soil is moderately high. The soil is managed for pine and hardwood. During wet periods the soil is soft and will not support heavy timber equipment.

The seasonal high water table caused by the slow permeability of the fragipan is the main limitation for nonfarm uses, especially for septic tank absorption fields, sewage lagoons, sanitary landfills, and dwellings.

The capability subclass is IIe.

28C—Monongahela loam, 7 to 15 percent slopes. This deep, strongly sloping, moderately well drained soil is on broad terraces along the rivers and major streams adjacent to the mountain foot slopes. Slopes are smooth and are about 150 to 400 feet long. Areas of this soil are commonly irregular in shape but parallel the course of the adjacent stream. They range from 3 to more than 40 acres.

Typically, the surface layer is brown loam about 11 inches thick. The subsoil extends to a depth of about 53 inches. To a depth of 24 inches it is yellowish brown silt loam and, in the lower part, clay loam. Between depths of 24 and 53 inches it is a fragipan of yellowish brown and strong brown clay loam that has light gray and light brownish gray mottles. The substratum to a depth of 60 inches is a mixture of strong brown and brownish yellow clay loam.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Chagrin, Purdy, and Berks soils. These soils make up 15 percent of this map unit.

Permeability of this Monongahela soil is moderate above the fragipan, and it is moderately slow or slow in the fragipan. The available water capacity is moderate. Runoff is slow to rapid. Tilth is good, but the soil is low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 24 inches. Root growth is severely restricted by the fragipan, which is commonly at a depth of about 20 to 30 inches. The surface layer and the subsoil are commonly strongly acid or very strongly acid unless lime has been applied.The seasonal high water table is at a depth of 1 1/2 to 3 feet.

Most areas of this soil are in woodland. A few areas are in pasture or hay crops.

This soil is moderately well suited to cultivated crops and to hay crops. Alfalfa is commonly short lived because of seasonal wetness and restricted root growth. The soil is droughty during the growing season. The hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including

Figure 4.—Unimproved pasture in an area of Monongahela loam, 2 to 7 percent slopes. Rigley-Weikert-Berks very stony complex, 15 to 25 percent slopes, is in the near background. Drall-Rubble land complex, 35 to 70 percent slopes, is in the far background.

grasses and legumes in the cropping system help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface soil and thereby reduces yields and increases erosion.

The potential for trees on this soil is moderately high. The soil is managed for pine and hardwood. During wet periods the soil is soft and will not support heavy timber equipment.

Slope and the seasonal water table are the main limitations for nonfarm uses of this soil, especially for septic tank absorption fields, sewage lagoons, sanitary landfills, and dwellings.

The capability subclass is IIIe.

29C—Montalto loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on lower foot slopes of the Blue Ridge. Many areas of this soil have shallow drainageways about 80 to 400 feet apart. Areas

of this soil follow the mountain ranges and are elongated or long and winding. They are 20 to 100 acres or more.

Typically, the surface layer of this soil is reddish brown loam about 6 inches thick. The subsoil, about 47 inches thick, is reddish brown silty clay loam in the upper part, red clay in the middle part, and yellowish red silty clay in the lower part. The substratum to a depth of 60 inches is red silt loam.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Hawksbill and Myersville soils. These included soils make up about 10 to 15 percent of this map unit. Also included are small areas of soils that have a very stony or extremely stony surface layer. These make up about 5 percent of the map unit.

Permeability of this Montalto soil is moderate, and the available water capacity is moderate. Runoff is medium to rapid. Tilth is fair. The soil is low in natural fertility and low in organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches. The surface layer and the subsoil are commonly very strongly acid to slightly acid unless lime has been applied.

Most of the acreage of this soil is in woodland. A large acreage is used for cultivated crops and pasture and hay crops.

This soil is moderately well suited to cultivated crops and to hay crops. The hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and low natural fertility of the soil. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, moderate permeability, and slope are the main limitations for most nonfarm uses. The moderate permeability and slope limit the use of this soil for septic tank absorption fields. Low strength limits the use of this soil for roadfill and local roads and streets.

The capability subclass is IIIe.

30C—Myersville silt loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on ridgetops and side slopes. Slopes are smooth or slightly convex and are 200 to 1,000 feet long. Areas of this soil range from 3 to over 100 acres.

Typically, the surface layer of this soil is dark brown silt loam about 6 inches thick. The subsoil is dark brown and yellowish red silty clay loam and gravelly silty clay loam and is about 34 inches thick. The substratum to a depth of 60 inches or more is light olive brown and red silty clay loam and silt loam.

Included with this soil in mapping are small areas of Chester, Manor, and Montalto soils. These soils make up about 20 percent of this map unit.

Permeability of this Myersville soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of at least 60 inches. The soil is low in organic matter content and medium in natural fertility. It is commonly very strongly acid or strongly acid throughout, but reaction in the surface layer and the upper part of the subsoil varies because of local liming practices.

Most areas of this soil are in pasture and hay crops. Some areas are cultivated, and a few are in woodland.

This soil is moderately well suited to cultivated crops, pasture, and hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to increase the organic matter content, maintain tilth, reduce crusting, increase water infiltration, and control erosion.

Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is very high. The wooded areas of this soil are managed mostly for pine. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slope and moderately permeable subsoil are the main limitations for nonfarm uses. Slope limits this soil for use as a building site. The moderate permeability limits use of the soil for septic tank absorption fields.

The capability subclass is IIIe.

30D—Myersville silt loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on ridgetops and side slopes. Slopes are smooth or slightly convex and are 200 to 1,000 feet long. Areas of this soil range from 3 to over 100 acres.

Typically, the surface layer of this soil is dark brown silt loam about 6 inches thick. The subsoil is dark brown and yellowish red silty clay loam and gravelly clay and is about 34 inches thick. The substratum to a depth of at least 60 inches is light olive brown and red silty clay loam and silt loam.

Included with this soil in mapping are small areas of Chester, Manor, and Montalto soils. These soils make up about 20 percent of this map unit.

Permeability of this Myersville soil is moderate, and the available water capacity is moderate. The erosion hazard is severe. The surface layer is friable and easily tilled. The subsoil has low shrink-swell potential. The root zone extends to a depth of at least 60 inches. The soil is low in organic matter content and medium in natural fertility. It is commonly very strongly acid or strongly acid throughout, but reaction in the surface layer and the upper part of the subsoil varies because of local liming practices.

Most areas of this soil are in pasture and hay crops. Some areas are cultivated, and a few are in woodland.

This soil is poorly suited to cultivated crops and moderately well suited to pasture and hay crops. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to increase the organic matter content of the soil, maintain tilth, reduce crusting, increase water infiltration, and control erosion.

Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is very high. The wooded areas of this soil are managed mostly for pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

The slope and moderately permeable subsoil are the main limitations for nonfarm uses. Slope limits this soil for use as a building site. The moderate permeability limits use of the soil for septic tank absorption fields.

The capability subclass is IVe.

31C—Myersville-Catoctin very stony silt loams, 7 to 15 percent slopes. This map unit is made up of strongly sloping, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. Areas of this map unit are on steep ridgetops of the Blue Ridge. These areas are convex and irregularly elongated. They are about 300 to 1,500 feet wide and 500 to 3,000 feet long, and they range from 25 to about 250 acres. Stones cover 3 to 15 percent of the surface.

The map unit is about 50 percent deep Myersville soil, 40 percent moderately deep Catoctin soil, and 10 percent soils of minor extent.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil extends to a depth of 40 inches. It is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of the Catoctin soil is dark brown very stony silt loam about 5 inches thick. The subsoil is dark yellowish brown and dark brown channery and very channery silt loam about 19 inches thick. The substratum, to a depth of 29 inches, is weathered rock. Bedrock is at a depth of 29 inches.

Included with these soils in mapping are small areas of deep Montalto soils.

Permeability is moderate in the Myersville soil and moderately rapid in the Catoctin soil. The available water capacity is moderate in the Myersville soil and low in the Catoctin soil. The surface layer of these soils is friable, but large stones make tillage impractical. These soils have low shrink-swell potential. The root zone in the Myersville soil extends to a depth of 60 inches or more, and the root zone in the Catoctin soil extends to a depth of 24 inches. The soils are moderate in organic matter content and medium in natural fertility. They are commonly slightly acid to strongly acid.

Nearly all of the acreage of this map unit is in woodland.

The soils in this map unit are not suited to cultivated crops. They are poorly suited to pasture and hay crops.

Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil, thereby increasing runoff and erosion.

The potential for trees is high for the Myersville soil and moderate for the Catoctin soil. These soils are managed for pine and hardwood. Seeds and seedlings grow well or moderately well on the Myersville soil if competing vegetation is controlled. They are affected by droughtiness during the growing season on the Catoctin soil.

Stoniness and depth to bedrock are the main limitations for nonfarm uses of these soils. Depth to bedrock limits the use of the soils for sanitary landfill, as building sites, and as septic tank absorption fields. Large stones limit the use of these soils as sites for playgrounds.

The capability subclass is VIs.

31D—Myersville-Catoctin very stony silt loams, 15 to 25 percent slopes. This map unit is made up of moderately steep, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. Stones cover 3 to 15 percent of the surface. This map unit is on steep ridgetops of the Blue Ridge. Areas are convex and irregularly elongated. They are about 300 to 1,500 feet wide and 500 to 3,000 feet long. They range from 25 to about 250 acres.

Of the total acreage of this map unit, about 50 percent is deep Myersville soil and 40 percent is moderately deep Catoctin soil. Included soils make up the rest.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil extends to a depth of 40 inches or more. It is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of the Catoctin soil is dark brown very stony silt loam about 5 inches thick. The subsoil is dark yellowish brown and dark brown channery and very channery silt loam about 19 inches thick. The substratum, which extends to a depth of 29 inches, is weathered rock. Bedrock is at a depth of 29 inches.

Included with these soils in mapping are small areas of deep Montalto soil.

Permeability of the Myersville soil is moderate, and that of the Catoctin soil is moderately rapid. The available water capacity is moderate in the Myersville soil and low in the Catoctin soil. The surface layer of these soils is friable, but large stones make tillage impractical. These soils have low shrink-swell potential. The root zone extends to a depth of 60 inches or more in the Myersville soil and to a depth of 24 inches in the Catoctin soil. The soils are moderate in organic matter content and medium in natural fertility. The soils are commonly slightly acid to strongly acid.

Nearly all of the acreage of this map unit is in woodland.

The soils in this unit are not suited to cultivated crops and are poorly suited to hay crops. The stones on the surface and the slope are limitations.

These soils are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pasture, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil, thereby increasing runoff and erosion.

The potential for trees is very high for the Myersville soil and moderate for the Catoctin soil. These soils are managed for pine and hardwood. Seeds and seedlings grow well on the Myersville soil if competing vegetation is controlled. They are affected by droughtiness during the growing season on the Catoctin soil. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope, stoniness, and depth to bedrock are the main limitations for nonfarm uses. Slope and depth to bedrock limit the use of the soils as sites for sanitary landfills, buildings, and septic tank absorption fields. Slope and large stones limit use of the soils for playgrounds.

The capability subclass is VIs.

31E—Myersville-Catoctin very stony silt loams, 25 to 65 percent slopes. This map unit is made up of steep and very steep, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. Areas of this map unit are on steep ridgetops of the Blue Ridge. These areas are convex and irregularly elongated. They are about 500 to 2,500 feet wide and 1,500 to 15,000 feet long, and they range from 30 to about 3,000 acres. Stones cover 3 to 15 percent of the surface.

The map unit is about 50 percent deep Myersville soil, 45 percent moderately deep Catoctin soil, and 5 percent other soils.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil extends to a depth of 40 inches. It is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of the Catoctin soil is dark brown very stony silt loam about 5 inches thick. The subsoil is dark yellowish brown and dark brown channery and very channery silt loam about 19 inches thick. The substratum to a depth of 29 inches is weathered rock. Bedrock is at a depth of 29 inches.

Included with these soils in mapping are small areas of deep Montalto soils.

Permeability is moderate in the Myersville soil and rapid in the Catoctin soil. The available water capacity is moderate in the Myersville soil and low in the Catoctin soil. The surface layer of these soils is friable, but large stones make tillage impractical. These soils have low shrink-swell potential. The root zone in the Myersville soil extends to a depth of 60 inches or more, and the root zone in the Catoctin soil extends to a depth of 24 inches. The soils are moderate in organic matter content and medium in natural fertility. They are commonly slightly acid to strongly acid.

Nearly all of the acreage of this map unit is in woodland (fig. 5).

The soils in this map unit are not suited to cultivated crops, pasture, and hay. The stones on the surface and the slope are limitations.

The potential for trees is very high for the Myersville soil and moderate for the Catoctin soil. These soils are managed for pine and hardwood. Seeds and seedlings

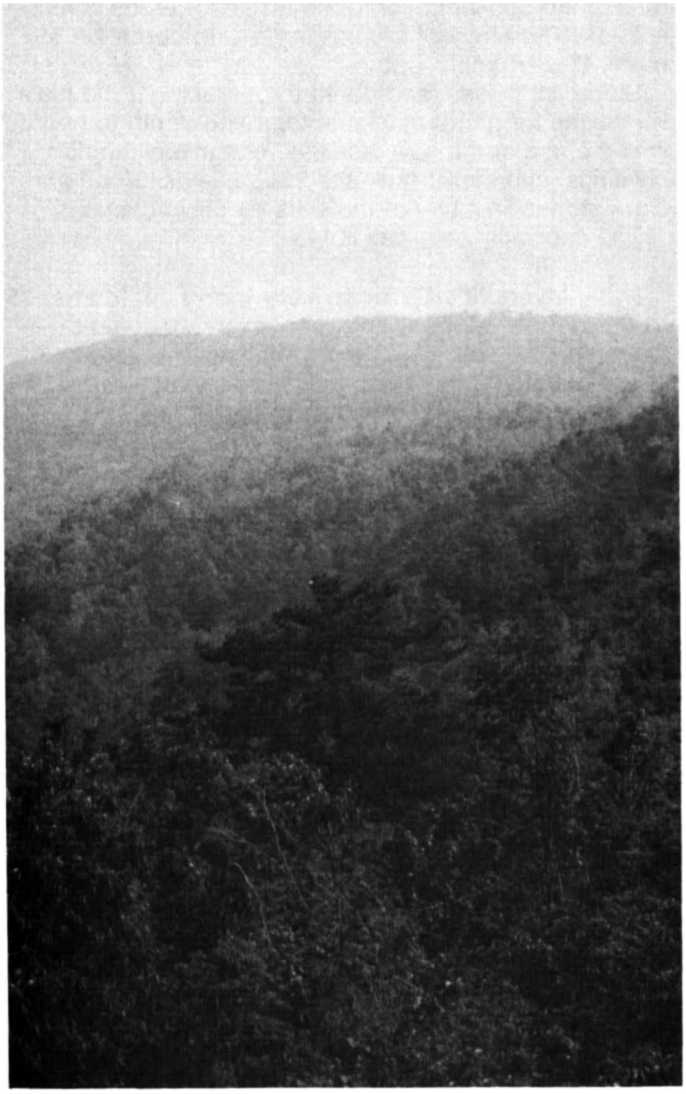


Figure 5.—Mixed hardwood and conifer forest in an area of Myersville-Catoctin very stony silt loams, 25 to 65 percent slopes.

grow well or moderately well on the Myersville soil if competing vegetation is controlled. They are affected by droughtiness during the growing season on the Catoctin soil. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby help control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope, stoniness, and depth to bedrock are the main limitations for nonfarm uses of these soils. Slope and depth to bedrock limit use of the soils as sites for sanitary landfills, buildings, and septic tank absorption fields. Slope and small stones limit use of the soils for playgrounds.

The capability subclass is VIIs.

32C—Myersville and Montalto very stony soils, 7 to 15 percent slopes. This map unit is made up of deep, strongly sloping, well drained soils. These soils are on ridgetops and side slopes of the Blue Ridge. Areas of this map unit are irregularly elongated. They are about 200 to 2,000 feet wide and 1,000 to 4,000 feet long, and they range from 20 to about 400 acres. Stones cover 3 to 15 percent of the surface.

Of the total acreage of this map unit, about 50 percent is Myersville very stony silt loam, 40 percent is Montalto very stony loam, and 10 percent is soils of minor extent. Some mapped areas consist entirely of the Myersville soil, some consist entirely of the Montalto soil, and some consist of both major soils.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil, to a depth of 40 inches, is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of the Montalto soil is reddish brown very stony loam about 6 inches thick. The subsoil, about 47 inches thick, is reddish brown silty clay loam in the upper part, red clay in the middle part, and yellowish red silty clay in the lower part. The substratum to a depth of 60 inches or more is red and strong brown, very strongly weathered rock.

Included with these soils in mapping are small areas, generally less than 3 acres, of moderately deep Catoctin soils and smaller areas of Chester and Manor soils.

Permeability is moderate in the Myersville soil and moderately slow in the Montalto soil. The available water capacity is moderate. The surface layer of these soils is friable, but large stones make tillage impractical. The subsoil of the Myersville soil has low shrink-swell potential, and the subsoil of the Montalto soil has high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soils are low in organic matter content and medium in natural fertility. These soils are commonly strongly acid through slightly acid.

Nearly all of the acreage of this map unit is in woodland.

The soils in this map unit are not suited to cultivated crops and are poorly suited to hay and pasture crops because of the surface stones. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil, thereby increasing runoff and erosion.

The potential for trees is very high for the Myersville soil and high for the Montalto soil. These soils are managed for pine and hardwood. Seeds and seedlings grow well if competing vegetation is controlled.

Moderately slow permeability in the Montalto soil, stoniness, clayey subsoil, shrink-swell potential, and low strength are the main limitations to nonfarm uses of these soils. The clay in the subsoil limits use of these soils for sanitary landfills.

The shrink-swell potential of the Montalto soil limits the construction of buildings in areas of this map unit, and the clayey subsoil limits excavation. Slope is an additional limitation in areas of the Myersville soil. The clayey subsoil of the Montalto soil is a major limitation affecting the traffic-supporting capacity of local roads and streets. The moderate or moderately slow permeability of the subsoil of the Myersville and Montalto soils limits the use of these soils as septic tank absorption fields. Slope and stoniness limit the use of these soils as sites for playgrounds.

The capability subclass is VIs.

32D—Myersville and Montalto very stony soils, 15 to 25 percent slopes. This map unit is made up of deep, moderately steep, well drained soils. These soils are on ridgetops and side slopes of the Blue Ridge. Areas of this map unit are irregularly elongated. They are about 200 to 2,000 feet wide and 1,000 to 4,000 feet long, and they range from 20 to about 400 acres. Stones cover 3 to 15 percent of the surface.

Of the total acreage of this map unit, about 50 percent is Myersville very stony silt loam, 40 percent is Montalto very stony loam, and 10 percent is soils of minor extent. Some mapped areas consist entirely of the Myersville soil, some consist entirely of the Montalto soil, and some consist of both major soils.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil, to a depth of 40 inches, is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of the Montalto soil is reddish brown very stony loam about 6 inches thick. The subsoil, about 47 inches thick, is reddish brown silty clay loam in the upper part, red clay in the middle part, and yellowish red silty clay in the lower part. The substratum to a depth of 60 inches or more is red and strong brown, very strongly weathered rock.

Included with these soils in mapping are small areas, generally less than 3 acres, of moderately deep Catoctin soils and smaller areas of Chester and Manor soils.

Permeability is moderate in the Myersville soil and moderately slow in the Montalto soil. The available water capacity is moderate. The surface layer of these soils is friable, but large stones make tillage impractical. The subsoil of the Myersville soil has low shrink-swell potential, and the subsoil of the Montalto soil has high shrink-well potential. The root zone extends to a depth of 60 inches or more. The soils are low in organic matter content and medium in natural fertility. These soils are commonly strongly acid to slightly acid.

Nearly all of the acreage of this map unit is in woodland.

The soils in this map unit are not suited to cultivated crops, and are poorly suited to pasture and hay crops because of the stones on the surface and the slope. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface soil, thereby increasing runoff and erosion.

The potential for trees is very high for the Myersville soil and high for the Montalto soil. These soils are managed for pine and hardwood. Seeds and seedlings grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby help control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope, stoniness, clayey subsoil, shrink-swell potential, moderately slow permeability in the Montalto soil, and low strength are the main limitations for nonfarm uses of these soils. The slope limits all these uses. The clay in the subsoil limits the use of these soils for sanitary landfills. The shrink-swell potential of the Montalto soil limits the construction of buildings in areas of this map unit, and the clayey subsoil limits excavation. The clayey subsoil of the Montalto soil is a major limitation affecting the traffic-supporting capacity of local roads and streets. The moderate or moderately slow permeability of the subsoil of the Myersville and Montalto soils limits the use of these soils as septic tank absorption fields. Slope and stoniness limit the use of these soils as sites for playgrounds.

The capability subclass is VIs.

32E—Myersville and Montalto very stony soils, 25 to 65 percent slopes. This map unit is made up of deep, steep and very steep, well drained soils. These soils are on ridgetops and side slopes of the Blue Ridge. Areas of this map unit are irregularly elongated. They are about 200 to 2,000 feet wide and 1,000 to 10,000 feet long, and they range from 20 to about 500 acres. Stones cover 3 to 15 percent of the surface.

Of the total acreage of this map unit, about 50 percent is Myersville very stony silt loam, 40 percent is Montalto very stony loam, and 10 percent is soils of minor extent. Some mapped areas consist entirely of the Myersville soil, some consist entirely of the Montalto soil, and some consist of both major soils.

Typically, the surface layer of the Myersville soil is dark brown very stony silt loam about 6 inches thick. The subsoil, to a depth of 40 inches, is yellowish red and dark brown silty clay loam and gravelly silty clay loam. The substratum to a depth of 60 inches is light olive

brown, red, and yellowish brown silty clay loam and silt loam.

Typically, the surface layer of Montalto soil is reddish brown very stony loam about 6 inches thick. The subsoil, about 47 inches thick, is reddish brown silty clay loam in the upper part, red clay in the middle part, and yellowish red silty clay in the lower part. The substratum to a depth of 60 inches or more is red and strong brown very strongly weathered rock.

Included with these soils in mapping are small areas, generally less than 3 acres, of moderately deep Catoctin soils and smaller areas of Chester and Manor soils.

Permeability is moderate in the Myersville soil and moderately slow in the Montalto soil. The available water capacity is moderate. The surface layer of these soils is friable, but large stones make tillage impractical. The subsoil of the Myersville soil has low shrink-swell potential, and the subsoil of the Montalto soil has high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soils are low in organic matter content and medium in natural fertility. These soils are commonly strongly acid through slightly acid.

Nearly all of the acreage of this map unit is in woodland.

The soils in this map unit are not suited to cultivated crops, pasture, and hay crops because of the stones on the surface and the slope.

The potential for trees is very high for the Myersville soil and high for the Montalto soil. These soils are managed for pine and hardwood. Seeds and seedlings grow well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby help control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope, stoniness, and depth to bedrock are the main limitations for nonfarm uses of these soils. Slope and depth to bedrock limit the use of the soils as sites for sanitary landfills, as building sites, and as septic tank absorption fields. Slope and small stones limit use of the soils as sites for playgrounds.

The capability subclass is VIIs.

33—Newark silt loam. This deep, nearly level, somewhat poorly drained soil is on flood plains along the larger streams. Areas of this soil are commonly elongated and follow the course of the adjacent stream. They are 5 to more than 30 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil, about 34 inches thick, consists of dark grayish brown silty clay loam. The substratum to a depth of 60 inches or more consists of dark grayish brown silty clay loam.

Included with this soil in mapping are small areas, generally less than two acres, of Chagrin and Zoar soils. Also included are small areas of very gravelly soils in abandoned channels and small areas of poorly drained soils. These included soils make up about 15 percent of this map unit.

Permeability of this Newark soil is moderate, and the available water capacity is high. Runoff is slow. The surface layer must be tilled when the moisture content is optimum for tillage to avoid clodding. The erosion hazard is slight. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and medium in natural fertility. It is commonly medium acid to mildly alkaline throughout. In winter and spring the soil may be flooded for brief periods and has a high water table at a depth of 1/2 foot to 1 1/2 feet.

Most areas of this soil are in pasture. A few areas are in cultivated crops.

This soil is poorly suited to cultivated crops and hay crops. Alfalfa is short lived because of seasonal wetness. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth and reduce crusting. Crops respond well to lime and fertilizer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, deferment of grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing and grazing when the soil is wet cause compaction of the surface soil and damage the stands of grasses and legumes.

The potential for trees on this soil is very high. This soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet and therefore will not support heavy timber equipment during wet periods.

The seasonal high water table and the hazard of flooding are the main limitations to nonfarm uses of this soil. The high water table and flooding limit the use of the soil as a site for septic tank absorption fields, sanitary landfills, shallow excavations, dwellings, and local roads and streets. Flooding limits the soil for most recreation uses.

The capability subclass is IIw.

34—Pits, quarries, and dumps. This miscellaneous area consists of open excavations from which limestone, shale, or quartz is mined and of dumps containing waste material. One mapped area includes a sewage disposal and pumping station, and areas at Viscose City include industrial ponds. Pits make up approximately 60 percent of this area and dumps make up 40 percent. Little or no vegetation grows in these areas; and in some of the pits, pools of water are common.

The limestone pits are near the Shenandoah River in the Riverton area and near U.S. 522 near Cedarville. They range from 3 to about 100 acres. Material from these pits is used for road construction and is used as a source of lime for agricultural use and for use in cement.

The shale pits are near Route 637 north of Riverton. They range up to 10 acres. This shale is used for building material and fill.

The quartz pits are north of Wildcat Knob at the foot of the Blue Ridge. They range up to about 10 acres. These pits are a source of material for road construction.

This miscellaneous area is poorly suited to farming, woodland, and wildlife habitat. Its suitability for urban and recreation uses ranges from fair to poor. Onsite investigation is needed to determine the suitability of the site for the intended use.

The limitations for farming and woodland use are lack of soil material, shallowness of the soil to bedrock, and droughtiness.

Some of the pits that contain water can be used for fishing.

A capability subclass is not assigned.

35—Purdy loam. This deep, poorly drained, nearly level soil is on terraces along major streams. Areas of this soil are commonly long and narrow and range from 5 to more than 30 acres.

Typically, the surface layer of this soil is dark grayish brown loam about 6 inches thick. The subsoil, about 26 inches thick, is grayish brown loam, silty clay, or clay loam. The substratum to a depth of more than 60 inches is yellowish red and gray sandy clay loam.

Included with this soil in mapping are small areas of Hawksbill and Zoar soils. These included soils make up about 15 percent of this map unit.

Permeability of this Purdy soil is slow or very slow, and the available water capacity is moderate. Surface runoff is slow. The surface layer is easily tilled when the moisture content is optimum for tillage. The erosion hazard is slight. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is medium in organic matter content and low in natural fertility. It is commonly very strongly acid or strongly acid, but reaction in the surface layer varies because of local liming practices. In winter and spring, this soil has a high water table at the surface or at a depth of 1 foot or less and is ponded sometimes.

Most areas of this soil are in pasture. A few areas are farmed, and a few are in woodland use.

This soil is poorly suited to cultivated crops and to hay crops. Alfalfa is short lived because of seasonal wetness. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain organic matter content and tilth and reduce crusting. Crops respond well to lime and fertilizer.

This soil is poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, deferment of grazing, and the use of lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing and grazing when the soil is wet cause compaction of the surface soil and damage the stands of grasses and legumes.

The potential for trees on this soil is very high. This soil is managed for pine and hardwood. Because of wetness, seeds and seedlings must be carefully managed to establish and maintain stands. The soil is soft when wet and therefore will not support heavy timber equipment during wet periods.

The seasonal high water table and low strength are the main limitations to nonfarm uses of this soil. The high water table limits the use of the soil for septic tank absorption fields, sanitary landfills, shallow excavations, and sites for dwellings. The water table also limits the use of this soil for most recreation uses. Low strength and the seasonal high water table limit this soil for roadfill and local roads and streets.

The capability subclass is IVw.

36E—Rigley very stony sandy loam, 25 to 60 percent slopes. This deep, steep, well drained soil is on side slopes of Massanutten Mountain. Areas of this soil are commonly long and winding. They are about 300 to 1,500 feet wide and 1,500 to 15,000 feet long. They range from about 50 to more than 800 acres. Stones cover 3 to 15 percent of the surface.

Typically, the surface layer of this soil is dark brown very stony sandy loam about 6 inches thick. The upper part of the subsoil is light yellowish brown, brownish yellow, and strong brown sandy loam and flaggy sandy loam and is about 35 inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish red flaggy loam.

Included with this soil in mapping are small areas, generally less than 3 acres, of Drall, Weikert, and Berks soils. These soils make up about 15 percent of this map unit.

Permeability of this Rigley soil is moderately rapid, and the available water capacity is low. Surface runoff is rapid. The erosion hazard is moderate. The surface layer is friable, but surface stoniness makes tillage of this soil impractical. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It is commonly strongly acid or very strongly acid throughout unless lime has been applied.

Nearly all areas of this soil are in woodland.

This soil is not suited to cultivated crops, pasture, and hay crops.

The potential for trees is high in areas of this soil on the north-facing slopes and moderately high in areas on the south-facing slopes. Seeds and seedlings survive and grow moderately well if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby help control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope is the main limitation for nonfarm uses. It limits use of the soil as a site for buildings, septic tank absorption fields, sanitary landfills, and local streets and roads, and it limits recreation uses.

The capability subclass is VIIs.

37D—Rigley-Weikert-Berks very stony complex, 15 to 25 percent slopes. This map unit is made up of well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. These soils are on side slopes of Massanutten Mountain. Areas of this map unit are long and winding, irregularly oval, and rectangular. They are about 100 to 1,000 feet wide and 500 to 2,000 feet long. They range from about 30 to more than 100 acres. Stones cover 3 to 15 percent of the surface.

The map unit is about 60 percent deep Rigley soils, 15 percent shallow Weikert soils, 15 percent moderately deep Berks soils, and 10 percent other soils.

Typically, the surface layer of the Rigley soils is dark brown very stony sandy loam about 6 inches thick. The upper part of the subsoil is light yellowish brown, yellowish brown, and strong brown sandy loam and flaggy sandy loam and is about 35 inches thick. The lower part to a depth of 60 inches is strong brown flaggy loam.

Typically, the surface layer of the Weikert soils is brown very stony silt loam 3 inches thick. The subsoil is mostly yellowish brown very shaly silt loam and is 6 inches thick. The substratum, to a depth of about 15 inches, is yellowish brown very shaly silt loam.

Typically, the surface layer of the Berks soils is yellowish brown very stony silt loam about 5 inches thick. The subsoil and the substratum, about 27 inches thick, are yellowish brown shaly or very shaly silt loam. Shale bedrock is at a depth of 32 inches.

Included with these soils in mapping are small areas, generally less than 3 acres, of Buchanan soils. These soils are near drainageways.

Permeability of the Rigley, Weikert, and Berks soils is moderately rapid, and the available water capacity is low. The surface layer of these soils is friable, but surface stoniness makes tillage impractical. The subsoil has low shrink-swell potential. The root zone extends to a depth of 60 inches or more in the Rigley soils, about 10 inches in the Weikert soils, and about 21 inches in the Berks soils. The soils are low in organic matter content and natural fertility. They are commonly strongly acid or very strongly acid.

Nearly all areas of these soils are in woodland use.

These soils are not suited to cultivated crops, pasture, and hay crops.

The potential for trees on the south-facing slopes is moderately high on the Rigley soils, low on the Weikert soils, and moderate on the Berks soils. On the north-facing slopes the potential is high on the Rigley soils, moderate on the Weikert soils, and moderately high on the Berks soils. These soils are managed mostly for hardwood. Seeds and seedlings grow well on the deep Rigley soils if competing vegetation is controlled. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby reduce erosion. The slope of these soils limits safe operation of heavy timber equipment.

Slope and stoniness are the main limitations for nonfarm uses of these soils. Shallowness to bedrock limits the Berks and Weikert soils for nonfarm uses. Slope limits the use of these soils as sites for buildings, local roads and streets, recreation, and septic tank absorption fields. Surface stoniness limits these soils for use as topsoil. Shallowness to rock limits the Berks and Weikert soils for use as trench sanitary landfills.

The capability subclass is VIIs.

38B—Sequoia silt loam, 2 to 7 percent slopes. This deep, gently sloping, well drained soil is on knolls and narrow ridgetops. Slopes are smooth and commonly complex. They are about 120 to 400 feet long. Areas of this soil are irregularly circular or are along the ridges and are elongated or long and winding. They are 5 to 50 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil, about 28 inches thick, is yellowish brown and brownish yellow silty clay loam, silty clay, and shaly clay. The substratum, from 38 to 60 inches, is yellowish brown and red weathered shale and streaks of light gray weathered shale.

Included with this soil in mapping and making up about 10 percent of this unit are small intermingled areas, generally less than 2 acres, of Berks soils. Also included are small areas of soils that have a silty clay loam surface layer, small areas of wet soils, and small areas of Rock outcrop. These inclusions make up about 10 percent of this map unit.

Permeability of this Sequoia soil is moderately slow, and the available water capacity is low. Runoff is medium. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of about 50 inches, but shale fragments limit root growth below a depth of about 38 inches. The surface layer and the subsoil are commonly very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to hay crops. The moderate hazard of erosion is a major management concern. Some other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping

system help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. The use of proper stocking rates, rotation of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil are helpful in maintaining pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is moderately high. The wooded areas of this soil are managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to rock, moderately slow permeability, low strength, moderate shrink-swell potential, and clayey subsoil are the main limitations for nonfarm uses of this soil. The moderately slow permeability limits the use of this soil for septic tank absorption fields. Low strength limits the use of this soil for roadfill and local roads and streets. Shrink-swell potential limits the use of the soil as a site for dwellings. Depth to rock is a limitation for dwellings with basements. The clayey subsoil limits the use of this soil for trench type sanitary landfills and topsoil.

The capability subclass is IIe.

38C—Sequoia silt loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on slightly convex side slopes of rolling, hilly uplands. Slopes are smooth, commonly complex, and about 300 to 800 feet long. Areas of this soil are along the ridges and are elongated or long and winding. They are 5 to 50 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil, about 28 inches thick, is yellowish brown and brownish yellow silty clay loam, silty clay, and shaly clay. The substratum, from 38 to about 52 inches, is yellowish brown weathered shale. From 52 to 60 inches is mostly light olive brown weathered shale.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Berks soils. Also included are small areas of Sequoia soils on steeper slopes. These included soils make up about 10 percent of the map unit. Also included are small areas of soils that have a silty clay loam surface layer, small areas of wet soils, and small areas of Rock outcrop. These inclusions make up about 10 percent of this map unit.

Permeability of this Sequoia soil is moderately slow, and the available water capacity is low. Runoff is medium. Tilth is fair, but the soil is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of about 50 inches, but shale fragments limit root growth below a depth of about 38 inches. The surface layer and the subsoil are commonly very strongly acid or strongly acid unless lime has been applied.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. The severe erosion hazard is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the acidity and the low natural fertility of the soil. If the soil is cultivated, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. The use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer to offset the acidity and the low natural fertility of the soil are helpful in maintaining pastures. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is moderately high. The wooded areas of this soil are managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet and therefore will not support heavy timber equipment during wet periods.

Depth to rock, moderately slow permeability, low strength, moderate shrink-swell potential, and a clayey subsoil are the main limitations for nonfarm uses. The moderately low permeability limits the use of this soil for septic tank absorption fields. Low strength limits the use of this soil for roadfill and local roads and streets. Shrink-swell potential limits the use of the soil as a site for dwellings. Depth to rock is a limitation for dwellings with basements. The clayey subsoil limits the use of this soil for trench sanitary landfills and topsoil.

The capability subclass is IIIe.

39B—Unison loam, 2 to 7 percent slopes. This deep, gently sloping, well drained soil is on broad terraces along the larger streams. Slopes are smooth and complex and are about 100 to 1,000 feet long. Areas of this soil are commonly elongated or irregularly rectangular. They are 5 to more than 100 acres.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil to a depth of 19 inches is yellowish brown silt loam. The subsoil material between depths of 19 and 60 inches is strong brown clay loam in the upper part and dark yellowish brown and yellowish brown cobbly clay loam in the lower part.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Lodi and Monongahela soils. These soils make up about 10 percent of this map unit. Also included are small areas of soils that have a dark red subsoil, sinkholes, small areas of Rock outcrop, and small areas of severely eroded soils. These inclusions make up about 10 percent of the map unit.

The permeability and the available water capacity of this soil are moderate. Runoff is medium. This soil can be tilled easily if its moisture content is optimum for tillage. It is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The surface layer is commonly strongly acid or medium acid unless lime has been applied. The subsoil is strongly acid or medium acid.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to hay crops. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the surface acidity and improve the fertility of the soil. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is very high. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

Low strength, moderate permeability, and the clayey subsoil are the main limitations for nonfarm uses. Low strength limits the use of this soil for roadfill and for local roads and streets. Moderate permeability limits the use of this soil for septic tank absorption fields. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills.

The capability subclass is IIe.

39C—Unison loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on broad terraces along the larger streams. Slopes are smooth and complex and are about 100 to 1,000 feet long. Areas of this soil are commonly elongated or irregularly rectangular. They are 5 to more than 100 acres.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil to a depth of 19 inches is yellowish brown silt loam. The subsoil material between depths of 19 and 60 inches is strong brown clay loam in the upper part and dark yellowish brown and yellowish brown cobbly clay loam in the lower part.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Lodi and Monongahela soils. These soils make up about 10 percent of this map unit. Also included are small areas of soils that have a dark red subsoil, sinkholes, small areas of Rock outcrop, and small areas of severely eroded soils. These inclusions make up about 10 percent of the map unit.

The permeability and the available water capacity of this Unison soil are moderate. Runoff is medium. This soil can be tilled easily if its moisture content is optimum for tillage. It is low in natural fertility and organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The surface layer of this soil is commonly strongly acid or medium acid unless lime has been applied. The subsoil is strongly acid or medium acid.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is moderately well suited to cultivated crops and to hay crops. The hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the surface acidity and improve the fertility of the soil. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is very high. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

Low strength, slope, moderate permeability, and the clayey subsoil are the main limitations for nonfarm uses. Low strength limits the use of this soil for roadfill and for local roads and streets. Moderate permeability and slope limit the use of this soil for septic tank absorption fields. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills.

The capability subclass is IIIe.

39D—Unison loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on broad terraces along the larger streams. Slopes are smooth and complex and are about 100 to 300 feet wide. Areas of this unit are long and winding. They range in size from 3 to more than 50 acres.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil to a depth of 15 inches is yellowish brown silt loam. The subsoil material between depths of 15 and 60 inches is strong brown clay loam in the upper part and dark yellowish brown and yellowish brown cobbly clay loam in the lower part.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Lodi and Monongahela soils. These soils make up about 10 to 15 percent of this map unit. Also included are small areas of Rock outcrop, sinkholes, and small areas of severely eroded soils. These inclusions make up about 5 percent of the map unit.

The permeability and the available water capacity of this Unison soil are moderate. Runoff is rapid. The soil can be tilled easily if its moisture content is optimum for tillage. It is low in natural fertility and low in organic matter content. The subsoil has moderate shrink-swell potential. The root zone extends to a depth below 60 inches. The surface layer is commonly slightly acid or medium acid, unless lime has been applied. The subsoil is strongly acid or medium acid.

Most areas of this soil are in woodland. A few areas are in pasture or hay crops.

This soil is poorly suited to cultivated crops and moderately well suited to hay crops. If the soil is cultivated, the hazard of erosion is severe and is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer to offset the surface acidity and improve the fertility of the soil. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to reduce runoff and control erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotational grazing of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on this soil is very high. The soil is managed for hardwood and pine. Seeds and seedlings survive and grow well on this soil. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff to help control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope and low strength limit the soil for most nonfarm uses. Slope limits this soil for septic tank absorption fields, sanitary landfills, and sites for dwellings. Low strength limits the use of this soil for roadfill and local roads and streets.

The capability subclass is IVe.

40C—Unison cobbly loam, 7 to 15 percent slopes. This deep, strongly sloping, well drained soil is on terraces along the larger streams. Areas of this soil are commonly long and winding. They range from 3 to about 100 acres.

Typically, the surface layer of this soil is yellowish brown cobbly loam about 7 inches thick. The upper part of the subsoil, from 7 to 19 inches, is yellowish brown gravelly silt loam. The lower part, from 19 to 60 inches, is strong brown, dark yellowish brown, and yellowish brown gravelly clay loam and cobbly clay loam. The substratum to a depth of 60 inches or more is strong brown and yellowish brown cobbly clay loam.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres, of Lodi and Monongahela soils. These soils make up about 20 percent of this map unit. Also included are small areas of soils containing sinkholes, small areas of Rock outcrop, and small areas of severely eroded soils. These inclusions make up about 5 percent of the map unit.

The permeability and the available water capacity of the Unison soil are moderate. Runoff is medium to rapid. The erosion hazard is severe. The surface layer is friable. Small stones interfere with tillage but do not make it impractical. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of about 60 inches or more. The soil is low in organic matter content and natural fertility. It is commonly strongly acid or very strongly acid throughout, but reaction in the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. Some areas are in pasture.

This soil is moderately well suited to cultivated crops and hay. Crops respond well to lime and fertilizer. Minimum tillage, use of cover crops, including grasses and legumes in the cropping system, and returning crop residue to the soil help to maintain the organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the use of proper stocking rates, rotational grazing of pastures, deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface soil and thereby increases runoff and erosion.

The potential for trees on this soil is very high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Slope, low strength, the clayey subsoil, and the moderate permeability rate are the main limitations for nonfarm uses. Slope and low strength limit use of the soil as a building site. The clayey subsoil and the slope limit the soil as a site for trench type sanitary landfills and excavations. Moderate permeability limits the soil as a site for septic tank absorption fields. Slope limits the soil for recreation uses.

The capability subclass is IIIe.

41C—Weikert-Berks shaly silt loams, 7 to 15 percent slopes. This map unit consists of strongly sloping, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. These soils are on the side slopes and noses of ridges. Slopes are rough and complex and are about 50 to 400 feet long. Areas of these soils commonly are along ridges, are long and winding, and range from 5 to 75 acres or more. Many of the larger areas of these soils have shallow drainageways that are 50 to 100 feet apart.

This map unit is about 55 percent shallow Weikert soil, 35 percent moderately deep Berks soil, and 10 percent soils of minor extent.

Typically, the surface layer of the Weikert soil is brown shaly silt loam about 3 inches thick. The subsoil and substratum, about 12 inches thick, are yellowish brown very shaly silt loam. Shale bedrock is at a depth of 15 inches.

Typically, the surface layer of the Berks soil is yellowish brown shaly silt loam about 5 inches thick. The subsoil and the substratum consist of yellowish brown shaly and very shaly silt loam. Shale bedrock is at a depth of 32 inches.

Included with these soils in mapping are small intermingled areas, generally less than 3 acres, of Sequoia soils. Also included are small wet areas and extremely stony areas along the drainageways and small areas of Rock outcrop along the tops, side slopes, and noses of ridges.

Permeability of the Weikert soil is moderately rapid and that of the Berks soil is moderate. The available water capacity is low. Runoff is rapid. These soils are low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 30 inches in the Berks soil and about 15 inches in the Weikert soil. The surface layer and the subsoil of these soils are commonly strongly acid or very strongly acid unless lime has been applied. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Most areas of these soils are in woodland. A few areas are in pasture and hay crops.

These soils are poorly suited to cultivated crops and to hay crops. They are very droughty during the growing season. The very severe hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer.

These soils are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major pasture management concerns. Use of proper stocking rates, rotation of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees is moderate for the Weikert soil and moderately high for the Berks soil. The soils are managed mostly for hardwood and pine. The survival of seeds and seedlings is affected by droughtiness during the growing season.

Slope and depth to bedrock are the main limitations for nonfarm uses. Slope and depth to rock limit the use of these soils as sites for buildings, sanitary landfills, and septic tank absorption fields.

The capability subclass is IVe.

41D—Weikert-Berks shaly silt loams, 15 to 25 percent slopes. This map unit consists of moderately steep, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. These soils are on the side slopes and noses of ridges. Slopes are rough and complex and are about 50 to 400 feet long. Areas of these soils commonly are along ridges, are long and winding, and range from 5 to 75 acres or more. Many of the larger areas of these soils have shallow drainageways that are 50 to 100 feet apart.

This map unit is about 50 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 10 percent soils of minor extent.

Typically, the surface layer of the Weikert soil is brown shaly silt loam about 3 inches thick. The subsoil and the substratum are yellowish brown very shaly silt loam. Shale bedrock is at a depth of 15 inches.

Typically, the surface layer of the Berks soil is yellowish brown shaly silt loam about 5 inches thick. The subsoil and the substratum are yellowish brown shaly and very shaly silt loam. Acid shale bedrock is at a depth of 27 inches.

Included with these soils in mapping are small intermingled areas, generally less than 3 acres, of Sequoia soils. Also included are small wet areas and extremely stony areas along the drainageways and small areas of Rock outcrop along the tops, side slopes, and noses of ridges.

Permeability is moderately rapid in the Weikert soil and moderate in the Berks soil. The available water capacity is low. Runoff is rapid. These soils are low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 15 inches in the Weikert soil and about 27 inches in the Berks soil. The surface layer and the subsoil of these soils are commonly strongly acid or very

strongly acid unless lime has been applied. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Most areas of these soils are in woodland. A few areas are in pasture.

These soils are not suited to cultivated crops and are poorly suited to pasture. They are very droughty during the growing season. The very severe hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil and the need for lime and fertilizer.

Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Proper stocking rates, rotation of pastures, deferment of grazing, and the use of lime and fertilizer help to maintain pasture. If the pasture is overgrazed, runoff increases and erosion is excessive.

The potential for trees on the south-facing slopes is low for the Weikert soil and moderate for the Berks soil. On the north-facing slopes, the potential is moderate for the Weikert soil and moderately high for the Berks soil. The soils are managed mostly for pine and hardwood. The survival of seeds and seedlings is affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope and depth to bedrock are the main limitations for nonfarm uses. Slope and depth to rock limit the use of these soils as sites for buildings, sanitary landfills, and septic tank absorption fields.

The capability unit is VIe.

41E—Weikert-Berks shaly silt loams, 25 to 65 percent slopes. This map unit consists of steep and very steep, well drained soils that are so intermingled that it is not practical to separate them at the scale used in mapping. These soils are on the side slopes of hills and ridges. Slopes are rough and complex and are about 50 to 600 feet long. Areas of these soils commonly are along the ridges, are long and winding, and range from 3 to 100 acres or more. Many of the larger areas of these soils have shallow drainageways 50 to 100 feet apart.

This map unit is about 55 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 5 percent soils of minor extent.

Typically, the surface layer of the Weikert soil is brown shaly silt loam about 3 inches thick. The subsoil and the substratum are yellowish brown shaly silt loam. Shale bedrock is at a depth of 13 inches.

Typically, the surface layer of the Berks soil is yellowish brown shaly silt loam about 3 inches thick. The subsoil and the substratum are yellowish brown shaly and very shaly silt loam. Acid shale bedrock is at a depth of 23 inches.

Included with these soils in mapping are small wet areas and extremely stony areas along the drainageways and small areas of Rock outcrop along the tops, side slopes, and noses of ridges.

Permeability is moderately rapid in the Weikert soil and moderate in the Berks soil. The available water capacity is low. Runoff is rapid. These soils are low in natural fertility and organic matter content. The subsoil has low shrink-swell potential. The root zone extends to a depth of about 15 inches in the Weikert soil and about 30 inches in the Berks soil. The surface layer and the subsoil of these soils are commonly strongly acid or very strongly acid unless lime has been applied. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Most areas of these soils are in woodland. A very few areas are in pasture.

These soils are not suited to use as cultivated cropland and are poorly suited to use as pasture. Slope is a limitation to those uses.

The potential for trees on the south-facing slopes is low for the Weikert soil and moderate for the Berks soil. On the north-facing slopes the potential is moderate for the Weikert soil and moderately high for the Berks soil. These soils are managed mostly for pine and hardwood. The survival of seeds and seedlings is affected by droughtiness during the growing season. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. The slope of the soil limits safe operation of heavy timber equipment.

Slope and depth to bedrock are the main limitations for nonfarm uses of these soils. Slope and depth to rock limit the use of these soils as sites for buildings, sanitary landfills, and septic tank absorption fields.

The capability unit is VIe.

42B—Zoar silt loam, 0 to 7 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is on slightly concave terraces along major rivers and streams and on uplands. Slopes are smooth. They are about 100 to 400 feet wide and range from 5 to 50 acres.

Typically, the surface layer is yellowish brown silt loam about 9 inches thick. The subsoil, about 30 inches thick, is yellowish brown and strong brown silt loam or silty clay loam. The substratum to a depth of 65 inches is brown and yellowish brown clay loam with thin layers of shale and sandstone pebbles.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres, of Monongahela soils. Also included are small areas of very poorly drained soils. These included areas make up to 15 percent of the map unit.

Permeability of this Zoar soil is slow, and the available water capacity is moderate. Runoff is medium. Tilth is good. The soil is medium in natural fertility and low in

organic matter content. The subsoil is slightly sticky and has moderate shrink-swell potential. The root zone extends to a depth of about 60 inches. In unlimed areas the surface layer and the upper part of the subsoil are strongly acid and the lower part of the subsoil is strongly acid or very strongly acid. The soil receives seepage and overflow from adjacent higher lying areas. It has a seasonal high water table at a depth of 1 1/2 to 2 1/2 feet in winter and spring.

Most areas of this soil are in cultivated crops. A few areas are in woodland.

This soil is well suited to cultivated crops and to hay crops if it is drained and if seepage and flooding are controlled. However, alfalfa is short lived because of seasonal wetness. The moderate hazard of erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the soil, the need for lime and fertilizer, and the need for artificial drainage and flood control. In cultivated areas, minimum tillage, use of cover crops, and including grasses and legumes in the cropping system can help to increase the organic matter content and maintain the tilth of the soil. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. The use of proper stocking rates, rotation of pastures, deferment of grazing, the use of lime and fertilizer, artificial drainage, and control of flooding are helpful in maintaining pasture. If the pasture is overgrazed, some of the desirable grasses and legumes die out and yields are reduced. Grazing during wet periods often divides and compacts the surface soil, thereby reducing yields.

The potential for trees on this soil is moderately high. The soil is managed for pine and hardwood. Seeds and seedlings survive and grow well if competing vegetation is controlled. When the soil is wet it is soft and will not support heavy timber equipment.

The seasonal high water table, seepage, low strength, and flooding are the main limitations for nonfarm uses of this soil. The seasonal high water table and the hazards of seepage and flooding limit the use of this soil for septic tank absorption fields and for houses with or without basements. Low strength limits the use of this soil as subgrade material for local roads and streets.

The capability subclass is IIw.

Prime farmland

Prime farmland, as defined by the U.S. Department of Agriculture, is that land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high crop yields if acceptable farming methods are used. Prime farmland produces the highest yields with minimal inputs of energy and money and farming it results in the least damage to the environment. Prime farmland is of major importance in satisfying the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and it should be used with wisdom and foresight.

Prime farmland is either currently used for producing food or fiber or is available for this use. Urban or built-up land or water areas are not included.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It has favorable temperature and growing season and acceptable reaction. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods or flooded during the growing season. Slope ranges mainly from 0 to 7 percent.

Soils that have a high water table or are subject to flooding may qualify as prime farmland soils if the limitations are overcome by drainage or flood control. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

About 12,895 acres, or nearly 9.2 percent of Warren County, meets the soil requirements for prime farmland. Areas of prime farmland are in all parts of the county.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal land, which generally is more erodible, more droughty, more difficult to cultivate, and less productive.

The following map units, or soils, make up prime farmland in Warren County. On one soil included in the list, appropriate measures have been applied to overcome flooding and wetness. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed soil map units." This list does not constitute a recommendation for a particular land use.

1B	Berks shaly silt loam, 2 to 7 percent slopes
17B	Dyke loam, 2 to 7 percent slopes
18B	Endcav silt loam, 2 to 7 percent slopes
23B	Lodi silt loam, 2 to 7 percent slopes
38B	Sequoia silt loam, 2 to 7 percent slopes
39B	Unison loam, 2 to 7 percent slopes
42B	Zoar silt loam, 0 to 7 percent slopes (where drained and protected from flooding)

Use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and pasture

L. Willis Miller, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 45,000 acres in the survey area was used for crops and pasture in 1967, according to the Virginia Conservation Needs Inventory. Of this total, about 3,000 acres was used for row crops (corn and soybeans); 2,000 acres, for close-grown crops (wheat, rye, oats, and barley); 4,000 acres, for rotation hay and pasture; 1,000 acres, for hay; 32,000 acres, for pasture; and 2,500 acres, for orchards, vineyards, and bush fruit. About 500 acres was idle land.

The acreage in crops in the county has gradually been decreasing; the acreage in pasture has been increasing as more beef cattle are raised. A small acreage of cropland and pasture has been converted to community development.

Pasture in the county commonly consists of tall fescue, orchardgrass, bluegrass, or clover. Most improved pastures are bluegrass and Ladino clover mixtures. Pastures of cool-season plants provide most of the grazing in spring and autumn.

Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major management concerns on pasture. The use of proper stocking rates, rotational and deferred grazing, weed control, restriction of grazing during the wet season, and the use of lime and fertilizer are the major management practices. Stockpiling the accumulated growth of tall fescue for winter grazing reduces the need for hay.

The major plants grown and harvested for hay are Kentucky bluegrass, orchardgrass, and Kentucky-31 fescue. Alfalfa is suitable for many soils in the survey area if the proper amounts of lime and fertilizer are applied.

Special crops grown in the county on a small scale are vegetables, peaches, strawberries, and nursery plants. Most are produced for local markets. Apples are grown on a larger scale and are marketed outside of the county. The deep, well drained Lodi soils in the valley are especially well suited to apples.

Most well drained soils in the county are suitable for orchards and nursery plants. Soils in low positions, where air drainage is poor and frost is frequent, are generally poorly suited to early vegetables, small fruits, or orchards.

Field crops suited to the soils and climate of the survey area include corn, soybeans, and grain sorghum. Wheat, oats, barley, and rye are the common small grains.

Soil tilth is important in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous. Poor tilth results in cloddy soils, less contact between soil and seed, and a poorer stand of plants.

Most soils used for crops in the survey area have a surface layer of fine sandy loam, loam, silt loam, or silty clay loam and are low in organic matter content. Generally, the structure of such a surface layer is weak, and rainfall causes a crust to form on the surface. Because the crust is hard when dry, it reduces infiltration of water and increases runoff. Regular additions of crop residue and other organic material help to improve soil structure and reduce crusting.

Maintaining tilth is a particular concern on the Blairton, Buchanan, Clearbrook, and Monongahela soils. These soils stay wet until about midspring in many years. If they are wet when plowed, they tend to be cloddy when dry. Preparing a good seed bed is difficult in areas of cloddy soils.

Soil erosion is the major concern on most of the cropland in Warren County. Most soils in the county have slopes of more than 2 percent and thus are susceptible to erosion.

Loss of the surface layer of the soil by erosion reduces the fertility and water holding capacity and, therefore, the productivity of the soil. Erosion is especially damaging to soils with a clayey subsoil, such as Carbo, Chilhowie, Dyke, Endcav, Lodi, Montalto, Sequoia, and Unison soils, and to soils with bedrock near the surface. Erosion also reduces productivity in soils that tend to be droughty, such as Millrock and Weikert soils.

Soil erosion results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Contour stripcropping and using grassed waterways are common erosion control practices in the survey area. They are best suited to soils with smooth, uniform slopes. Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils with long, regular slopes. Lodi soils and some Dyke soils are suitable for terraces. Substantial plant cover is required to control erosion on these soils.

Minimum tillage, leaving crop residue on the surface, and using winter cover crops help to increase infiltration and reduce runoff and erosion.

Using a cropping system that keeps the plant cover on the soil for extended periods can hold erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion, provide nitrogen, and improve soil tilth for the following crop in the system.

Drainage is a major management need on a small acreage used for crops and pasture in the survey area. Some soils are naturally so wet that production of crops common to the area is generally not practical or possible unless the soils are drained. These soils include the somewhat poorly drained and moderately well drained Blairton soils, the somewhat poorly drained Buchanan, Clearbrook, and Newark soils, and the poorly drained Purdy soils.

The design of surface and subsurface drainage systems varies with the kind of soil. In some areas a combination of surface drainage and subsurface drainage can be used. Drains have to be more closely spaced in soils with slow permeability than in more permeable soils. Subsurface drainage is suited to soils with moderate permeability, such as Blairton soils. Some soils that have a fragipan can be drained with subsurface drains providing the depth to the fragipan is great enough to allow adequate cover.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the

Cooperative Extension Service can provide information about the management and productivity of the soils.

Land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed soil map units."

Woodland management and productivity

Norman O. Wilson, forester, Soil Conservation Service, assisted in preparing this section.

Woodland is the most extensive land use in Warren County. About 84,000 acres, or 60 percent of the county, is presently in woodland; and of that, about 71,000 acres is classified as commercial forest.

In general, there are three major forest cover types in the county. The oak-hickory forest cover type makes up 62 percent of the commercial woodland and is commonly on Berks, Weikert, Myersville, and Montalto soils.

The elm-ash-cottonwood forest cover type makes up 30 percent of the commercial woodland and commonly grows well on Blairton, Buchanan, and Clearbrook soils.

The oak-pine forest cover type makes up 8 percent of the commercial woodland and commonly is on Lodi, Carbo, and Chilhowie soils.

About 92 percent of the forest soils have a moderate to low productivity rating. The rest have a productivity rating of moderately high.

The oak-pine and oak-hickory forest cover types have the greatest potential for forest improvement. Presently, there is an opportunity to improve some of these low stands by utilizing the low quality trees for firewood and releasing the better trees for future growth.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are

insignificant. If a soil has more than one limitation, the priority is as follows: w, d, c, s, f, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than

once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, lovegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are broom sedge, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild

herbaceous plants. The wildlife attracted to these areas include bobwhite quail, woodchuck, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, whitetail deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building site development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for

dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an

area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a

cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering index properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and chemical properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and water features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave

and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 16, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning river, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Udifluvents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, mesic Aeric Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*3*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*4*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Berks series

Soils of the Berks series are moderately deep and well drained. These soils are on uplands. They formed in weathered products of shale, siltstone, and fine-grained sandstone. Slopes range from about 2 to 65 percent.

Berks soils are commonly near Buckton, Weikert, Sequoia, and Blairton soils. Berks soils are deeper than Weikert soils, which are less than 20 inches deep to shale bedrock. Berks soils are coarser textured and shallower to bedrock than Sequoia and Buckton soils, and they are better drained than the Blairton soils.

Typical pedon of Berks shaly silt loam, 7 to 15 percent slopes, 0.2 mile north of intersection of Veach Gap Trail and Virginia Route 613:

O1—2 inches to 1 inch; loose leaves and twigs.
O2—1 inch to 0; very dark grayish brown (10YR 3/2) organic matter.
A1—0 to 5 inches; yellowish brown (10YR 5/4) shaly silt loam; weak fine granular structure; friable; slightly sticky and nonplastic; common fine pores; many fine and medium roots; 20 percent shale fragments up to 1 inch long; very strongly acid; clear smooth boundary.
B1—5 to 9 inches; yellowish brown (10YR 5/4) shaly silt loam; weak fine and medium subangular blocky structure; friable; slightly sticky and nonplastic; common fine and medium roots; few fine discontinuous pores; 35 percent shale fragments up to 2 inches long; very strongly acid; clear wavy boundary.
B2—9 to 21 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak fine and medium subangular blocky structure; friable; slightly sticky and nonplastic; few fine and medium roots; few fine discontinuous pores; 50 percent shale fragments up to 3 inches long; very strongly acid; clear irregular boundary.
Cr—21 to 32 inches; yellowish brown (10YR 5/8) very shaly silt loam; massive; friable; slightly sticky and nonplastic; few fine roots; few fine discontinuous pores; 80 percent shale fragments up to 6 inches long; very strongly acid; clear irregular boundary.
R—32 inches; rippable shale.

The solum is 20 to 34 inches thick. Depth to bedrock is 20 to 40 inches. Shale and sandstone fragments up to 6 inches long make up 10 to 50 percent of the A horizon, 25 to 75 percent of the B horizon, and 60 to 90 percent of the C horizon. Reaction is very strongly acid or strongly acid throughout the soil.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 3 or 4. It is shaly, channery, very channery, or very stony silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is shaly, very shaly, channery, or very channery silt loam or loam.

Bedrock is commonly fractured shale and fine grained sandstone.

Blairton series

Soils of the Blairton series are moderately deep and somewhat poorly drained to moderately well drained. They are on uplands. These soils are derived mainly from acid sandstone and gray, acid shale. Slopes range from 2 to 15 percent.

Blairton soils are commonly near Berks, Weikert, and Sequoia soils. Blairton soils are somewhat poorly drained to moderately well drained; and Berks, Weikert, and Sequoia soils are well drained. Blairton soils contain fewer shale fragments than Berks and Weikert soils, and they contain less clay than Sequoia soils. Blairton soils are deeper to bedrock than Weikert soils and not as deep as Sequoia soils.

Typical pedon of Blairton silt loam, 2 to 7 percent slopes, 15 feet east of Virginia Route 613, 0.4 mile north of intersection of Virginia Routes 673 and 613:

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; 5 percent shale fragments; many fine roots; medium acid; abupt smooth boundary.
B1t—5 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; 10 percent shale fragments; few fine and medium roots; strongly acid; gradual smooth boundary.
B21t—13 to 21 inches; yellowish brown (10YR 5/6) shaly silty clay loam; many fine faint brown (10YR 5/3) and many medium distinct grayish brown (2.5Y 5/2) mottles; moderate fine subangular blocky structure; friable, sticky and slightly plastic; thin patchy clay films; 30 percent shale fragments; strongly acid; gradual wavy boundary.
C—21 to 36 inches; grayish brown (2.5Y 5/2) very shaly silt loam with many medium distinct strong brown (10YR 5/6) and few fine distinct yellowish red (5YR 5/6) mottles; massive; friable; 60 percent shale fragments; strongly acid; clear irregular boundary.
R—36 inches; light olive brown (2.5Y 5/4) and very dark grayish brown (2.5Y 3/2) fractured shale and sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Angular shale and sandstone fragments make up 5 to 25 percent of the A horizon, 10 to 50 percent of the B horizon, and 30 to 70 percent of the C horizon. Reaction is very strongly acid or strongly acid unless the soil is limed.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 through 4. It is silt loam or loam or a shaly analog of one of those textures.

The B horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 2 through 6. Low chroma mottles are present at a depth of 12 to 18 inches in the Bt horizon. This horizon is silt loam or silty clay loam or the shaly analog of one of those textures.

The C horizon is similar in color to the Bt horizon. It is loam or silt loam or the shaly or very shaly analog of one of those textures.

Buchanan series

Soils of the Buchanan series are deep and somewhat poorly drained. They are on lower mountain foot slopes. They have a fragipan at a depth of about 20 inches. These soils developed in old colluvium derived largely

from acid sandstone and shale. Slopes range from 7 to 15 percent.

Buchanan soils are commonly near the Rigley, Berks, and Weikert soils. Buchanan soils have a fragipan, which the Berks, Weikert, and Rigley soils do not have. Also, Buchanan soils are more poorly drained than the Rigley, Berks, and Weikert soils.

Typical pedon of Buchanan fine sandy loam, 7 to 15 percent slopes, 0.4 mile north of intersection of Veach Gap Trail and Virginia Route 613:

O1—3 inches to 1 inch; loose leaves and twigs.
O2—1 inch to 0; very dark brown (10YR 2/2) organic matter.
A1—0 to 7 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; many fine and common medium and coarse roots; 10 percent angular sandstone fragments up to 3 inches in diameter; common fine discontinuous pores; strongly acid; clear smooth boundary.
B1t—7 to 20 inches; light yellowish brown (10YR 6/4) loam; common medium distinct strong brown (7.5YR 5/6) and reddish brown (5YR 4/4) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and common medium roots; few fine discontinuous pores; 15 percent angular sandstone fragments up to 6 inches in diameter; few thin patchy clay films; strongly acid; abrupt wavy boundary.
Bx1—20 to 37 inches; strong brown (7.5YR 5/6), brown (7.5YR 5/4), and yellowish brown (10YR 5/6) channery sandy clay loam; moderate medium and coarse subangular blocky structure; firm, brittle, slightly sticky and nonplastic; common fine discontinuous pores; 30 percent angular sandstone fragments up to 4 inches in diameter; strongly acid; clear smooth boundary.
Bx2—37 to 60 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) channery sandy clay loam; common fine distinct light brownish gray (2.5Y 6/2) and few fine faint pale brown (10YR 6/3) mottles; moderate medium angular and subangular blocky structure; firm, brittle, slightly sticky and nonplastic; few fine discontinuous pores; 40 percent angular sandstone fragments up to 10 inches in diameter; strongly acid.

The solum ranges from 40 to 60 inches or more in thickness. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 24 inches. Content of rock fragments ranges from 5 to 40 percent in the A horizon, from 5 to 35 percent in the Bt horizon, and from 15 to 60 percent in the Bx horizon. These fragments consist chiefly of sandstone and quartzite channers and pebbles. Reaction is very strongly acid or strongly acid throughout unless the soil is limed.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4. It is fine sandy loam or its gravelly, cobbly, stony, or very stony analog.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. The Bt horizon is clay loam or loam or a cobbly or gravelly analog.

The Bx horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. The Bx horizon is sandy clay loam or clay loam or a channery, very channery, gravelly, or very gravelly analog.

The C horizon, if present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. Low and high chroma mottles are common in this horizon. Texture is the same as in the Bx horizon.

Buckton series

Soils of the Buckton series are deep and well drained. They formed in sediments that were washed from uplands that consisted of limestone, calcareous shale, and sandstone. These soils are on flood plains. Slopes range from 0 to 2 percent.

Buckton soils commonly are near the Berks soils. Buckton soils contain fewer coarse fragments throughout than Berks soils.

Typical pedon of Buckton silt loam, 1,200 feet south of Lake John, 125 yards southeast of Virginia Route 612:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; few fine and medium pores; neutral; gradual smooth boundary.
C1—7 to 18 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; few fine and medium pores; slight effervescence; mildly alkaline; gradual smooth boundary.
C2—18 to 29 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine and few medium roots; many fine pores; slight effervescence; mildly alkaline; gradual smooth boundary.
C3—29 to 48 inches; dark brown (10YR 3/3) silt loam; weak coarse subangular blocky structure parting to weak fine granular; friable; few medium and fine roots; slight effervescence; mildly alkaline; gradual smooth boundary.
IIC4—48 to 73 inches; brown (10YR 4/3) fine sand with few thin layers of loam; single grain; loose; mildly alkaline.

Depth to bedrock is more than 5 feet. The content of coarse fragments—shale, chert, and sandstone fragments up to 6 inches in diameter—ranges from 0 to 2 percent in the upper 40 inches and from 0 to 20 percent or more below 40 inches. The A horizon is

neutral through moderately alkaline. The C horizon is mildly alkaline or moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. It is silt loam, loam, very fine sandy loam, or silty clay loam.

The C horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. The texture is silt loam, silty clay loam, loam, silty clay, or clay loam and is commonly stratified.

The IIC horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4. High chroma mottles are in some pedons. The texture is variable. It is fine sandy loam, sandy loam, sand, fine sand, loam, thin layers of silt loam or clay loam, or the gravelly or cobbly analog of one of those textures.

Carbo series

Soils of the Carbo series are moderately deep and well drained. These soils are on uplands. They formed in weathered products of limestone or interbedded limestone and calcareous shale. Slopes range from 7 to 15 percent.

Carbo soils are commonly near the Lodi, Endcav, and Chilhowie soils. Carbo soils have a thinner solum than the Endcav and Lodi soils and a thicker solum than the Chilhowie soils.

Typical pedon of Carbo silty clay loam in an area of Carbo-Endcav silty clay loams, very rocky, 7 to 15 percent slopes, 0.2 mile east of Virginia Route 340, 300 feet north of Virginia Route 639:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure; friable, sticky and plastic; few fine roots; common fine and very fine pores; few worm channels; neutral; abrupt smooth boundary.

B21t—7 to 15 inches; strong brown (7.5YR 5/6) clay; strong fine and medium subangular blocky structure; firm, sticky and plastic; few fine roots; common fine pores; thin patchy clay films; strongly acid; clear irregular boundary.

B22t—15 to 26 inches; strong brown (7.5YR 5/6) clay; common distinct yellowish brown (10YR 5/4) mottles; moderate medium and coarse prismatic structure; firm, sticky and very plastic; few fine roots; common fine and very fine pores; thick continuous clay films; common slickensides; strongly acid; abrupt smooth boundary.

B23t—26 to 32 inches; dark brown (7.5YR 4/4) and yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky and very plastic; few fine roots; common fine and very fine pores; thick patchy clay films; many very dark gray (10YR 3/1) oxide stains; 5 percent limestone fragments up to 10 inches in diameter; slightly acid; abrupt smooth boundary.

R—32 inches; hard limestone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Concretions make up 0 to 5 percent of the solum. Reaction is very strongly acid through neutral in the A horizon and the upper part of the B horizon and medium acid through mildly alkaline in the lower part of the B horizon.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The B horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 8.

The C horizon, where present, has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 4 through 8. It is silty clay or clay.

Cataska series

Soils of the Cataska series are shallow and well drained. These soils are on uplands. They formed in the weathered products of phyllite. Slopes range from 7 to 65 percent.

Cataska soils are commonly near Montalto, Hawksbill, and Lew soils. Cataska soils have less clay throughout the profile than Montalto soils. Cataska soils are shallower to bedrock than Montalto, Hawksbill, and Lew soils. Cataska soils do not have the coarse greenstone fragments that are in Hawksbill and Lew soils.

Typical pedon of Cataska slaty silt loam, 15 to 25 percent slopes, 0.4 mile northeast of Virginia Route 647 and 300 feet west of Virginia Route 603:

O1—5 to 3 inches; loose leaves and twigs.

O2—3 inches to 0; organic matter.

A1—0 to 4 inches; yellowish brown (10YR 5/4) slaty silt loam; weak fine granular structure; friable; slightly sticky, nonplastic; many fine and medium and few coarse roots; 35 percent angular phyllite fragments up to 2 inches long; strongly acid; abrupt smooth boundary.

B1—4 to 10 inches; yellowish brown (10YR 5/4) slaty silt loam; weak fine subangular blocky structure; friable; slightly sticky, nonplastic; many fine and medium and few coarse roots; common fine discontinuous pores; 45 percent angular phyllite fragments up to 5 inches long; strongly acid; gradual smooth boundary.

B2—10 to 17 inches; yellowish brown (10YR 5/4) very slaty silt loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; many medium and few coarse roots; 55 percent angular phyllite fragments up to 6 inches long; strongly acid; clear wavy boundary.

Cr—17 to 35 inches; yellowish brown (10YR 5/4) very flaggy silt loam; moderate fine and medium blocky rock controlled structure; friable; 70 percent phyllite fragments up to 14 inches long; strongly acid; broken discontinuous boundary.

R—35 inches; dark phyllite bedrock.

The solum is 12 to 18 inches thick. Depth to hard bedrock ranges from 20 to 40 inches. Fragments of slate or phyllite make up 20 to 35 percent of the A horizon and 35 to 60 percent of the B horizon. The Cr horizon contains many slate and phyllite fragments and very little soil in the interstices.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 4 through 6. It consists of the slaty or very slaty analog of silt loam or loam.

The Cr horizon has the same range in color as the B horizon. It consists of the channery, very channery, flaggy, or very flaggy analog of silt loam or loam.

Catoctin series

Soils of the Catoctin series are moderately deep and well drained. These soils are on uplands. They formed in the weathered products of green schist. Slopes range from 7 to 65 percent. Catoctin soils in this survey area are mapped only with Myersville soils.

Catoctin soils are commonly near Lew, Myersville, and Unison soils. Catoctin soils contain fewer coarse fragments than Myersville and Unison soils and are not as deep to bedrock as the Lew, Myersville, and Unison soils.

Typical pedon of Catoctin very stony silt loam in an area of Myersville-Catoctin very stony silt loams, 25 to 65 percent slopes, 100 feet east of Skyline Drive, across from Gooney Run overlook on the Blue Ridge:

O1—3 inches to 1 inch; loose leaves and twigs.
O2—1 inch to 0; organic matter.
A1—0 to 5 inches; dark brown (10YR 4/3) very stony silt loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine and medium roots; 35 percent angular greenstone fragments up to 30 inches in diameter; medium acid; clear wavy boundary.
B1—5 to 13 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many fine, common medium, and few coarse roots; common fine discontinuous pores; 45 percent angular greenstone fragments up to 7 inches in diameter; medium acid; clear wavy boundary.
B2—13 to 24 inches; dark brown (7.5YR 4/4) very channery silt loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; common fine discontinuous pores; 50 percent angular greenstone fragments up to 10 inches in length; thin patchy clay films on faces of rock fragments; medium acid; clear wavy boundary.
Cr—24 to 29 inches; rippable greenstone bedrock.
R—29 inches; hard greenstone bedrock.

The solum is 12 to 30 inches thick. Depth to bedrock is 20 to 40 inches and averages about 23 inches. Coarse fragments make up 5 to 35 percent of the A horizon and 25 to 55 percent of the B horizon. Reaction ranges from strongly acid through slightly acid in the subsoil.

The A horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 through 4. It is loam or silt loam or a very stony or channery analog.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is channery or very channery loam, silt loam, silty clay loam, or clay loam. Some pedons contain mottles of 5YR hue.

The C horizon has hue of 7.5YR to 2.5YR, value of 4 through 6, and chroma of 4 through 6. Texture is channery or very channery loam or silt loam. Coarse fragments make up 35 to 80 percent. Reaction ranges from medium acid to neutral.

Chagrin series

Soils of the Chagrin series are deep and well drained. These soils are on flood plains. They formed in alluvial material weathered from limestone, sandstone, and shale. Slopes range from 0 to 2 percent.

Chagrin soils are commonly near Buckton, Millrock, Newark, and Zoar soils. Chagrin soils do not have the free carbonates typical of Buckton soils. Chagrin soils are better drained than Newark and Zoar soils, and they contain less sand throughout than the Millrock soils.

Typical pedon of Chagrin fine sandy loam, Thunderbird Archaeological Museum, 200 feet south of Virginia Route 623, 1/4 mile west of Virginia Route 673:

Ap—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; friable; many fine roots; many fine pores; medium acid; clear smooth boundary.
B1—10 to 20 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak moderate subangular blocky structure; friable; many very fine roots; many fine pores; few worm channels; slightly acid; clear wavy boundary.
B2—20 to 31 inches; dark yellowish brown (10YR 4/4) loam; weak moderate subangular blocky structure; friable; many fine pores; many worm channels; neutral; clear wavy boundary.
C—31 to 37 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; many worm channels; neutral; clear wavy boundary.
Ab—37 to 60 inches; dark grayish brown (10YR 3/2) loam; many fine distinct strong brown (7.5YR 5/6) mottles; weak moderate subangular blocky structure; friable; few fine pores; few worm channels; neutral.

The solum is 24 to 42 inches thick. Depth to bedrock is more than 5 feet. Coarse fragments make up 0 to 10 percent of the A horizon and 0 to 15 percent of the B and C horizons. Reaction ranges from medium acid to neutral.

The A horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4. It is fine sandy loam, loam, or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4. It is loam, silt loam, or fine sandy loam.

The C horizon has color and texture similar to the B horizon. Some pedons have stratified sand below a depth of 40 inches.

Chester series

Soils of the Chester series are deep and well drained. These soils are on uplands. They formed in the weathered products of granodiorite. Slopes range from 7 to 65 percent.

Chester soils are commonly near Myersville, Montalto, Lew, Manor, and Catoctin soils. Chester soils have more sand and less silt in the profile than Myersville soils. They have less clay in the profile than Montalto soils. Chester soils have fewer coarse fragments in the profile than Lew soils. They have more clay in the subsoil than Manor soils. Chester soils are deeper to bedrock than Catoctin soils.

Typical pedon of Chester loam, 7 to 15 percent slopes, 3 miles southwest of Browntown on Virginia Route 631, approximately 0.1 mile north and east of road, Hogback area:

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky and nonplastic; many fine roots; common fine pores; 10 percent angular granodiorite fragments up to 3 inches in diameter; neutral; abrupt smooth boundary.

B1t—6 to 13 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and few medium roots; common fine pores; few thin patchy clay films; few worm channels and casts; 5 percent angular granodiorite fragments up to 3 inches in diameter; neutral; clear smooth boundary.

B21t—13 to 25 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few fine and medium roots; common fine pores; many thin patchy clay films; medium acid; clear smooth boundary.

B22t—25 to 40 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; common fine pores; thin continuous clay films; tonguing and interfingering of clay materials; medium acid; gradual wavy boundary.

C—40 to 60 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) sandy loam; massive; friable, slightly sticky and nonplastic; few fine roots; many fine and medium pores; few thin patchy clay films; strongly acid.

The solum is 30 to 50 inches thick. Depth to bedrock is more than 5 feet. Angular granodiorite fragments make up 0 to 10 percent of the A and B1 horizons, 0 to 5 percent of the B2t and B3t horizons, and 0 to 15 percent of the C horizon. Reaction is very strongly acid or strongly acid unless the soil is limed.

The A horizon is loam or its stony or very stony analog.

The B1t horizon has hue of 7.5YR or 10YR. It is loam or silt loam.

The B2t horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 6 through 8. It is clay loam or sandy clay loam.

The B3t horizon, if present, has hue of 7.5YR, value of 5, and chroma of 8. It is sandy clay loam.

The C horizon has hue of 7.5YR, value of 5 or 6, and chroma of 6 through 8. It is loam or sandy loam.

Chilhowie series

Soils of the Chilhowie series are moderately deep and well drained. These soils are on uplands. They formed in the weathered products of limestone and interbedded limestone and shale. Slopes range from 15 to 25 percent.

Chilhowie soils are commonly near Carbo, Lodi, and Endcav soils. Chilhowie soils are shallower to bedrock than Endcav and Lodi soils. Chilhowie soils have a thinner solum than Carbo and Lodi soils.

Typical pedon of Chilhowie silty clay loam, rocky, 15 to 25 percent slopes, 2.65 miles north of intersection of U.S. Highway 522 and Interstate Highway 66, 1,250 feet south of intersection of Virginia Highway 675 and U.S. Highway 522, 500 feet west of U.S. Highway 522:

Ap—0 to 3 inches; dark brown (10YR 3/3) silty clay loam; moderate fine and medium granular structure; friable; many fine roots; 10 percent limestone channers up to 12 inches long; slightly acid; abrupt smooth boundary.

B21t—3 to 8 inches; dark yellowish brown (10YR 4/4) silty clay; moderate fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; common fine roots; common very fine and fine discontinuous pores; thin patchy clay films; neutral; clear smooth boundary.

B22t—8 to 19 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few fine roots; few very fine discontinuous pores; thick continuous clay films; few wormcasts; neutral; gradual wavy boundary.

C—19 to 23 inches; strong brown (7.5YR 5/6) very flaggy clay; massive; 70 percent shale and limestone flags and channers; moderately alkaline; gradual wavy boundary.
R—23 inches; hard, interbedded limestone and shale.

The solum is 10 to 20 inches thick. Depth to bedrock is 20 to 40 inches. Content of limestone and shale fragments is 0 to 15 percent in the solum and 25 to 70 percent in the C horizon. Reaction in the solum ranges from slightly acid to mildly alkaline. Reaction in the substratum ranges from neutral to moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. It is silty clay loam or silty clay.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is silty clay or clay.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is channery, very channery, flaggy, or very flaggy silty clay or clay.

Clearbrook series

Soils of the Clearbrook series are moderately deep and somewhat poorly drained. These soils are on uplands. They are derived mainly from acid shale. Slopes range from 2 to 15 percent.

Clearbrook soils are commonly near Berks, Weikert, and Blairton soils. Clearbrook soils are somewhat poorly drained or poorly drained. Unlike the Clearbrook soils, the Berks and Weikert soils are well drained. The Clearbrook soils contain more coarse fragments in the solum than Blairton soils.

Typical pedon of Clearbrook shaly silt loam, 2 to 7 percent slopes, 0.2 mile west of intersection of Virginia Highways 627 and 637, 200 yards south of Highway 637:

Ap—0 to 6 inches; dark brown (10YR 4/3) shaly silt loam; weak fine granular structure; friable; many very fine and fine roots; many fine pores; 20 percent angular shale fragments up to 1/2 inch in diameter; slightly acid; abrupt smooth boundary.
B1—6 to 10 inches; yellowish brown (10YR 5/4) shaly silt loam; common fine distinct strong brown (7.5YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable; common fine and very fine roots; many fine pores; 30 percent angular shale fragments up to 2 inches in diameter; strongly acid; clear wavy boundary.
B2t—10 to 26 inches; light brownish gray (2.5Y 6/2) very shaly silty clay; common medium prominent strong brown (7.5YR 5/8) and few fine prominent red (2.5YR 4/6) mottles; weak fine subangular blocky structure; friable, sticky and slightly plastic; thin patchy clay films on faces of peds; few fine roots; 50 percent angular shale fragments up to 6 inches in diameter; very strongly acid; gradual irregular boundary.
Cr—26 to 38 inches; pale yellow (5Y 7/3) and light olive gray (5Y 6/2) very shaly silty clay; common fine prominent strong brown (7.5YR 5/6) mottles; thin patchy clay films on surfaces of shale fragments; 70 percent angular shale fragments up to 8 inches in diameter; very strongly acid.
R—38 inches; light olive brown (2.5Y 5/4) and grayish brown (2.5Y 5/2) soft shale.

The solum is 18 to 30 inches thick. Depth to bedrock is 20 to 40 inches. Fragments of shale make up 15 to 35 percent of the Ap horizon, 25 to 60 percent of the B horizon, and 50 to 80 percent of the C horizon. Reaction in the solum is very strongly acid or strongly acid unless the soil is limed.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 3. It is shaly silt loam or loam.

The B horizon has hue of 10YR through 5Y, value of 5 or 6, and chroma of 2 through 4. Texture of the B horizon is the shaly or very shaly analog of silt loam, silty clay loam, or clay.

The C horizon is similar in color to the B horizon. It is very shaly silty clay loam or very shaly silty clay.

Craigsville series

Soils of the Craigsville series are deep and well drained. These soils are on flood plains. They formed in moderately coarse textured alluvium. Slopes range from 0 to 5 percent.

Craigsville soils are commonly near Berks and Buchanan soils. Craigsville soils are on flood plains not typical of Berks and Buchanan soils. They are also more than 40 inches deep to bedrock. Unlike Buchanan soils, Craigsville soils do not have a fragipan.

Typical pedon of Craigsville cobbly sandy loam, 0 to 5 percent slopes, 0.6 mile south of intersection of Virginia Highways 678 and 613, 800 feet west of Passage Creek:

O1—3 inches to 1 inch; loose leaves and twigs.
O2—1 inch to 0; very dark grayish brown (10YR 3/2) organic matter.
A1—0 to 3 inches; dark brown (10YR 4/3) cobbly sandy loam; weak fine granular structure; friable; many fine and medium roots; few fine pores; 15 percent rounded and angular sandstone fragments up to 5 inches in diameter; very strongly acid; abrupt smooth boundary.
B21—3 to 12 inches; yellowish brown (10YR 5/6) cobbly sandy loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine pores; few clay coatings on sand grains; 35 percent rounded and angular sandstone fragments up to 6 inches in diameter; very strongly acid; clear wavy boundary.

B22—12 to 40 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; weak fine and medium subangular blocky structure; very friable; few medium roots; few organic stains on faces of rock fragments; 60 percent rounded and angular sandstone channers and flags up to 15 inches in diameter; very strongly acid; clear smooth boundary.

IIC1—40 to 46 inches; yellowish brown (10YR 5/6) loamy sand; single grained; loose; few fine roots; 5 percent rounded and angular sandstone fragments up to 10 inches in diameter; very strongly acid; clear wavy boundary.

IIIC2—46 to 60 inches; yellowish brown (10YR 5/6) cobbly sandy loam; common distinct light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable; few fine roots; 35 percent rounded and angular sandstone fragments up to 10 inches in diameter; very strongly acid.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 5 feet. Rounded pebbles and cobbles make up 5 to 50 percent of the A horizon and 35 to 65 percent of the B and C horizons. The soil is very strongly acid or strongly acid throughout unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. It is sandy loam, cobbly sandy loam, or gravelly sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is cobbly or very cobbly sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. It is the very gravelly, gravelly, cobbly or very cobbly analog of loamy sand or sandy loam. Some pedons have thin strata containing less than 35 percent gravel or cobbles.

Dekalb series

Soils of the Dekalb series are moderately deep and well drained. These soils are on uplands. They formed in the weathered products of sandstone and quartzite. Slopes range from 25 to 65 percent.

Dekalb soils are commonly near Cataska, Catoctin, Lew, Myersville, and Montalto soils. Dekalb soils differ from Cataska soils in not having a Cr horizon. Dekalb soils have less base saturation than Catoctin soils. Dekalb soils are 20 to 40 inches deep to bedrock, whereas Lew soils are more than 60 inches deep to bedrock. Dekalb soils have less clay in the profile than Myersville and Montalto soils, and they are yellower throughout than Montalto soils.

Typical pedon of Dekalb channery loam, 25 to 65 percent slopes, 1.75 miles northeast of junction of Virginia Highways 603 and 648, 200 feet north of Eagle Craig Road:

O1—2 inches to 0; loose leaves and twigs and organic matter.

A1—0 to 5 inches; yellowish brown (10YR 5/4) channery loam; weak fine and medium granular structure; friable; many fine, common medium, and few coarse roots; few fine discontinuous pores; 30 percent sandstone fragments up to 8 inches in diameter; very strongly acid; clear smooth boundary.

B1t—5 to 15 inches; yellowish brown (10YR 5/4) flaggy silt loam; weak fine subangular blocky structure; friable; many fine and common medium and coarse roots; common fine discontinuous pores; common thin patchy clay films on faces of peds; 30 percent sandstone fragments up to 12 inches in diameter; very strongly acid; abrupt wavy boundary.

B21t—15 to 24 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) channery sandy loam; weak medium subangular blocky structure; friable; common fine roots; few fine discontinuous pores; few thin patchy clay films bridging sand grains; few thin coatings on sand grains; 45 percent sandstone fragments up to 4 inches in diameter; strongly acid; clear irregular boundary.

B22—24 to 33 inches; very pale brown (10YR 7/4) and dark yellowish brown (10YR 4/4) channery sandy loam; moderate medium subangular blocky structure; firm, slightly brittle; few fine and medium roots; common fine discontinuous pores; 30 percent sandstone fragments up to 4 inches in diameter; very strongly acid; gradual irregular boundary.

C—33 to 39 inches; light yellowish brown (10YR 6/4) very channery sandy loam; moderate fine and medium platy structure; firm, brittle; few fine roots; common fine discontinuous pores; 55 percent sandstone fragments up to 8 inches in diameter; strongly acid; gradual irregular boundary.

R—39 to 60 inches; strongly weathered, white (2.5Y 8/2) sandstone.

The thickness of the solum and the depth to bedrock are 20 to 40 inches. Angular sandstone fragments of pebble, cobble, and flagstone size make up 20 to 30 percent of the A horizon, 30 to 50 percent of the B horizon, and 35 to 60 percent of the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 5, and chroma of 4 to 6. It is channery loam, channery sandy loam, or channery silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 7, and chroma of 4 through 6. It is flaggy or channery sandy loam, flaggy or channery loam, or flaggy or channery silt loam.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is channery sandy loam or very channery sandy loam.

Drall series

Soils of the Drall series are deep and excessively drained. These soils are on uplands. They formed in siliceous material weathered from sandstone, quartzite, and conglomerates. Slopes range from 35 to 70 percent.

Drall soils are commonly near Weikert and Berks soils. Drall soils are deeper to bedrock than Weikert and Berks soils, and they contain more sand than those soils.

Typical pedon of Drall very stony loamy sand in an area of Drall-Rubble land complex, 35 to 70 percent slopes, 50 feet west of Veach Gap Trail and 50 feet from top of Massanutten Mountain:

O1—4 to 2 inches; loose leaves and twigs.
O2—2 inches to 0; black (10YR 2/1) organic matter.
A1—0 to 4 inches; grayish brown (10YR 5/2) and pale brown (10YR 6/3) very stony loamy sand; weak fine granular structure; very friable; few fine and many medium roots; 35 percent angular sandstone fragments up to 26 inches in diameter; very strongly acid; clear smooth boundary.
B—4 to 22 inches; light yellowish brown (10YR 6/4) channery loamy sand; weak medium granular structure; very friable; few fine, many medium, and few coarse roots; 45 percent angular sandstone fragments up to 24 inches in diameter; strongly acid; clear wavy boundary.
C—22 to 42 inches; light yellowish brown (10YR 6/4) very channery loamy sand; weak medium granular structure; very friable; few fine, many medium, and few coarse roots; 60 percent angular sandstone fragments up to 24 inches in diameter; very strongly acid; abrupt smooth boundary.
R—42 inches; hard quartzite rock.

Solum thickness ranges from 20 to 40 inches. Depth to bedrock is 40 to 60 inches. Coarse fragments of quartzite or sandstone make up 35 to 50 percent of the A and B horizons and 40 to 90 percent of the C horizon. Reaction is very strongly acid or strongly acid.

The A1 horizon has hue of 10YR, value of 3 through 5, and chroma of 1 or 2. Some pedons have an A2 horizon that has hue of 10YR, value of 5 or 6, and chroma of 1. The A horizon is channery, very channery, or very stony loamy sand.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 6.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 6. Texture is channery or very channery loamy sand.

Dyke series

Soils of the Dyke series are deep and well drained. These soils are on foot slopes, fans, and high terraces. They formed in colluvium from soils and rocks high in ferromagnesium minerals. Slopes range from 2 to 15 percent.

Dyke soils are commonly near Lodi, Hawksbill, Monongahela, and Unison soils. Dyke soils have a redder subsoil than all of those soils. They have more clay and fewer coarse fragments in the solum than Hawksbill soils. Unlike Monongahela soils, Dyke soils do not have a fragipan.

Typical pedon of Dyke loam, 2 to 7 percent slopes, 500 feet northeast of railroad, 500 feet southwest of Leach Run, on Front Royal effluent disposal site:

Ap—0 to 9 inches; dark reddish brown (5YR 3/4) loam; weak fine and medium granular structure; friable; many fine roots; few very fine and fine discontinuous pores; 5 percent angular sandstone fragments up to 3 inches in diameter; neutral; abrupt smooth boundary.
B21t—9 to 18 inches; dark red (2.5YR 3/6) clay; moderate medium prismatic structure; firm, sticky and slightly plastic; common fine and very fine discontinuous pores; few fine roots; few worm channels; thin patchy clay films; common dark oxide stains; 3 percent angular sandstone fragments up to 2 inches in diameter; neutral; clear smooth boundary.
B22t—18 to 44 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; sticky and slightly plastic; few fine discontinuous pores; few fine roots; thick patchy clay films; common dark oxide stains; 15 percent rounded and angular weathered greenstone fragments; strongly acid; gradual wavy boundary.
IIB23t—44 to 66 inches; dark red (2.5YR 3/6) cobbly silty clay loam; weak medium and fine subangular blocky structure; friable; few fine discontinuous pores; thin patchy clay films; 30 percent rounded highly weathered greenstone and quartzite fragments up to 6 inches in diameter; very strongly acid.

The solum is 40 to 80 inches thick. Depth to bedrock is more than 5 feet. In some pedons, angular and rounded cobblestones are in thin stone lines. The solum is 3 to 30 percent gravel and cobbles. Some pedons have a C horizon that is 20 to 50 percent gravel and cobblestones. Reaction is strongly or very strongly acid unless the soil is limed.

The Ap horizon has hue of 2.5YR or 5YR, value of 2 through 3, and chroma of 3 through 6. It is loam or silt loam.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 4 through 8. It is clay, silty clay, or cobbly silty clay loam.

The C horizon has the same range in color as the Bt horizon. It is cobbly or very cobbly clay or silty clay.

Endcav series

Soils of the Endcav series are deep and well drained. They formed in material weathered from limestone and are in the residual valley uplands. Slopes range from 2 to 15 percent.

Endcav soils are commonly near Carbo, Chilhowie, and Lodi soils. Endcav soils are deeper to bedrock than Carbo and Chilhowie soils. Endcav soils are less acid in the B horizon than Lodi soils.

Typical pedon of Endcav silt loam, 2 to 7 percent slopes, 1,200 feet east of intersection of U.S. Highway 522 and Virginia Route 639, approximately 300 yards north of Route 639 and 100 yards east of lane:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; firm, sticky and slightly plastic; many fine and very fine roots; common fine pores; slightly acid; abrupt smooth boundary.

B21t—7 to 15 inches; strong brown (7.5YR 5/6) clay; moderate medium and coarse blocky structure; firm, sticky and plastic; few very fine roots; few fine pores; thick continuous clay films; brown coatings on faces of peds; medium acid; clear smooth boundary.

B22t—15 to 26 inches; yellowish brown (10YR 5/6) clay; many fine distinct yellowish red (5YR 5/6) mottles; weak medium prismatic structure parting to medium and coarse blocky; firm, sticky and plastic; few very fine roots; common fine pores; thick continuous clay films; clay flows in pores; common slickensides; medium acid; clear wavy boundary.

B23t—26 to 35 inches; strong brown (7.5YR 5/6) clay; common fine distinct yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few fine and very fine pores; thick patchy clay films; common slickensides; many black (10YR 2/1) manganese concretions; slightly acid; clear broken boundary.

B24t—35 to 50 inches; yellowish brown (10YR 5/6) clay; common fine and medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few fine and very fine pores; thick patchy and thin continuous clay films; many black (10YR 2/1) manganese stains; mildly alkaline; abrupt smooth boundary.

R—50 inches; hard limestone.

The solum ranges in thickness from 40 to 60 inches or more. Depth to hard bedrock ranges from 40 inches to 60 or more inches. The content of coarse fragments, commonly angular chert, ranges from 0 to 10 percent in the A horizon and 0 to 15 percent in the B horizon. The reaction ranges from strongly acid to neutral in the A horizon and upper part of the B horizon and from medium acid through mildly alkaline in the lower part of the B horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 6, and chroma of 3 or 4. The A horizon is silt loam, loam, or silty clay loam.

The Bt horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. Hue of 5YR is restricted to the lower part of the B2t horizon.

Hawksbill series

Soils of the Hawksbill series are deep and well drained. These soils are on terraces and colluvial fans. They formed in the weathered products of greenstone and sandstone. Slopes range from 2 to 15 percent.

Hawskbill soils are commonly near Montalto, Myersville, and Unison soils. Hawksbill soils contain more coarse fragments in the solum than all those soils. Hawksbill soils have less clay in the profile than Montalto and Unison soils.

Typical pedon of Hawksbill cobbly loam, 2 to 7 percent slopes, 500 feet southeast of Happy Creek, 200 feet east of railroad track, Front Royal town property:

Ap—0 to 6 inches; dark brown (10YR 4/3) cobbly loam; weak fine granular structure; friable; many fine roots; common fine pores; 25 percent greenstone fragments up to 5 inches in diameter; neutral; clear smooth boundary.

B21t—6 to 13 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine and very fine pores; 40 percent greenstone fragments up to 2 inches in diameter; neutral; clear wavy boundary.

B22t—13 to 25 inches; brown (7.5YR 4/4) gravelly loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and very fine roots; common fine and very fine pores; 40 percent greenstone fragments up to 5 inches in diameter; slightly acid; clear wavy boundary.

C1—25 to 47 inches; brown (7.5YR 4/4) very cobbly clay loam; weak fine granular structure; friable, slightly sticky and nonplastic; common fine and very fine pores; 60 percent greenstone fragments up to 7 inches in diameter; neutral; clear wavy boundary.

C2—47 to 60 inches; brown (7.5YR 4/4) very cobbly clay loam; massive; friable, slightly sticky and slightly plastic; common fine and very fine pores; 65 percent greenstone fragments up to 8 inches in diameter; neutral.

The solum is 20 to 30 inches thick. Depth to bedrock is more than 5 feet. Angular and rounded greenstone fragments make up 20 to 50 percent of the A horizon, 35 to 50 percent of the Bt horizon, and 50 to 70 percent of the C horizon. The A horizon is medium acid or slightly

acid unless limed, and the B and C horizons range from medium acid through neutral.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3. It is gravelly, very gravelly, cobbly, or very cobbly loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 4. It is gravelly loam, gravelly clay loam, very gravelly clay loam, cobbly loam, or cobbly clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 4. It is very gravelly loam, very gravelly clay loam, or very cobbly clay loam.

Lew series

Soils of the Lew series are deep and well drained. These soils are on upper mountain slopes of the Blue Ridge. They formed in the weathered products of greenstone colluvium. Slopes range from 7 to 65 percent.

Lew soils are commonly near Myersville, Montalto, Catoctin, and Unison soils. Lew soils have more coarse fragments in the subsoil than Myersville, Montalto, and Unison soils. Lew soils are deeper to bedrock than Catoctin soils.

Typical pedon of Lew channery loam, 7 to 25 percent slopes, Shenandoah National Park, 0.5 mile south of chain gate, 30 feet east of Landes Run Road:

O1—4 to 2 inches; loose leaves and twigs.

O2—2 inches to 0; organic material.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine granular structure; friable; many fine and few medium and coarse roots; few fine discontinuous pores; 20 percent angular granodiorite fragments up to 30 inches in diameter; strongly acid; gradual wavy boundary.

B&A—8 to 12 inches; dark yellowish brown (10YR 4/4) (B part) and dark brown (10YR 3/3) (A part) channery loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and few medium and coarse roots; few fine discontinuous pores; 25 percent angular granodiorite fragments up to 15 inches in diameter; strongly acid; gradual wavy boundary.

B1t—12 to 19 inches; dark yellowish brown (10YR 4/4) channery clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine medium and coarse roots; few fine discontinuous pores; few thin patchy clay films; 35 percent angular granodiorite fragments up to 10 inches in diameter; strongly acid; clear wavy boundary.

B21t—19 to 36 inches; brown (7.5YR 4/4) flaggy clay loam; moderate medium blocky structure; friable, slightly sticky and nonplastic; few fine medium and coarse roots; few fine discontinuous pores; thin patchy clay films; 45 percent angular granodiorite fragments up to 40 inches in diameter; medium acid; clear wavy boundary.

B22t—36 to 48 inches; brown (7.5YR 4/4) channery sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; common fine discontinuous pores; thin patchy clay films; 35 percent angular greenstone and granodiorite fragments up to 8 inches in diameter; strongly acid; clear wavy boundary.

B3—48 to 58 inches; yellowish brown (10YR 5/8) channery sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; common fine discontinuous pores; 45 percent angular greenstone and granodiorite fragments up to 10 inches in diameter; strongly acid; gradual wavy boundary.

C—58 to 60 inches; yellowish brown (10YR 5/8) channery sandy loam; massive; very friable, nonsticky and nonplastic; few fine roots; 45 percent angular greenstone and granodiorite fragments up to 10 inches in diameter; strongly acid.

The solum ranges in thickness from 42 to 60 inches or more. Depth to bedrock is more than 5 feet. Fragments of crystalline rock make up 10 to 50 percent of the A horizon, 35 to 70 percent of the B horizon, and 35 to 50 percent of the C horizon. Reaction in the soil is very strongly acid through medium acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. It is silt loam or loam or a channery or flaggy analog.

The upper part of the Bt horizon has hue of 5YR through 10YR, value of 4, and chroma of 4. The lower part of the Bt horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 6 or 8. The Bt horizon is channery, very channery, flaggy, or very flaggy clay loam, sandy clay loam, and silty clay loam.

The B3 and C horizons have colors similar to those in the Bt horizon. They are channery, very channery, flaggy, or very flaggy sandy loam or loam.

Lodi series

Soils of the Lodi series are deep and well drained. They formed in the weathered products of limestone and are in the residual valley uplands. Slope ranges from about 2 to 45 percent.

Lodi soils are commonly near Endcav, Carbo, and Chilhowie soils. Lodi soils are more acid in the B horizon than Endcav soils. Lodi soils are deeper to bedrock than Carbo soils, and they have a thicker solum than Chilhowie soils.

Typical pedon of Lodi silt loam, 2 to 7 percent slopes, 0.4 mile east of intersection of Virginia Routes 658 and 639, 0.5 mile northeast of Route 639, in open pasture, 100 feet northeast of old fence row:

Ap—0 to 6 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; friable, slightly sticky and plastic; common very fine roots; common very fine pores; common worm channels; common manganese concretions; neutral; abrupt smooth boundary.

B21t—6 to 12 inches; yellowish red (5YR 5/6) clay; weak fine subangular blocky structure; friable, sticky and plastic; few fine roots; few fine pores; few worm channels; common discontinuous clay films; strongly acid; clear smooth boundary.

B22t—12 to 22 inches; yellowish red (5YR 4/6) clay; moderate medium subangular blocky structure; friable, slightly sticky and plastic; many thick continuous clay films; few fine roots; few fine pores; few worm channels; strongly acid; clear wavy boundary.

B23t—22 to 41 inches; multicolored yellowish red (5YR 5/6), olive yellow (2.5Y 6/6), and reddish brown (5YR 4/4) clay; moderate medium subangular blocky structure; firm, slightly sticky and plastic; many thick continuous clay films; common fine and medium pores; strongly acid; clear wavy boundary.

C—41 to 63 inches; multicolored yellowish red (5YR 4/4, 5/6) and brownish yellow (10YR 6/8) clay; massive; friable; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. Coarse fragments of limestone and chert make up 0 to 15 percent of the solum. Reaction is very strongly acid or strongly acid throughout, except where the Ap horizon has been limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4. It is silt loam, loam, or silty clay loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 through 8. It is silty clay loam or clay.

The C horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. It is silty clay loam, silty clay, or clay.

Manor series

Soils of the Manor series are deep and well drained. These soils are on uplands. They formed in weathered products of granodiorite. Slopes range from 15 to 25 percent. Manor soils in this survey area are mapped only with Chester soils.

Manor soils are commonly near Chester, Lew, and Catoctin soils. Manor soils have more sand and less clay in the subsoil than Chester soils, have fewer coarse fragments throughout the profile than Lew soils, and are deeper to bedrock than Catoctin soils.

Typical pedon of Manor cobbly sandy loam in an area of Chester-Manor very stony complex, 15 to 25 percent slopes, 1.8 miles east of intersection of Virginia Routes 634 and 622, 60 yards north of Jenkins Gap foot trail, Shenandoah National Park:

A1—0 to 3 inches; dark yellowish brown (10YR 4/6) cobbly sandy loam; weak fine granular structure; friable; many fine and medium roots; 15 percent granodiorite fragments up to 8 inches in diameter; very strongly acid; abrupt smooth boundary.

B1—3 to 12 inches; yellowish brown (10YR 5/6) cobbly sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many fine and medium roots; few fine discontinuous pores; 20 percent granodiorite fragments up to 12 inches in diameter; very strongly acid; clear wavy boundary.

B2—12 to 21 inches; yellowish brown (10YR 5/6) cobbly sandy loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; few medium roots; clay bridging on sand grains; 15 percent granodiorite fragments up to 18 inches in diameter; very strongly acid; clear smooth boundary.

B3—21 to 31 inches; yellowish brown (10YR 5/6) cobbly sandy loam; strong medium and coarse subangular blocky structure; firm, nonsticky and nonplastic; few fine roots; common fine and medium discontinuous pores; 15 percent granodiorite fragments up to 2 inches in diameter; very strongly acid; clear irregular boundary.

C1—31 to 40 inches; strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) sandy loam; common fine distinct yellow (10YR 7/6) mottles; massive; firm, nonsticky and nonplastic; few fine roots; clay flows on coarse fragments; 5 percent granodiorite fragments up to 2 inches in diameter; very strongly acid; clear irregular boundary.

C2—40 to 49 inches; strong brown (7.5YR 5/8) sandy loam; many coarse distinct brown (7.5YR 5/4) mottles; massive; firm; nonsticky, nonplastic; strong brown (7.5YR 5/6) clay flows on sand grains; 5 percent granodiorite fragments up to 1/2 inch in diameter; very strongly acid; clear wavy boundary.

Cr—49 to 60 inches; strongly weathered brownish yellow (10YR 6/8) granodiorite; few fine distinct reddish yellow (7.5YR 6/8) mottles.

The solum is 20 to 36 inches thick. Depth to bedrock is more than 5 feet. Granodiorite pebbles, cobbles, and stones make up 5 to 15 percent of the A horizon, 10 to 20 percent of the B horizon, and 5 to 20 percent of the C horizon. Reaction is very strongly acid throughout.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 4 to 6. It is sandy loam or cobbly sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It is sandy loam or cobbly sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is sandy loam or cobbly sandy loam.

In this survey area the Manor soils are a taxadjunct to the Manor series because they contain less mica in the profile; have a thicker, more sandy solum; and have a yellower hue of 10YR than defined in the range for the series.

Millrock series

Soils of the Millrock series are deep and well drained. These soils are on flood plains. They formed in alluvium washed from soils underlain by sandstone and shale. Slopes range from 0 to 7 percent.

Millrock soils are commonly near Chagrin, Buckton, and Zoar soils. Millrock soils contain more sand and less silt and clay throughout than do those soils. Unlike Buckton soils, Millrock soils do not have free carbonates. Millrock soils are better drained than the Newark soils and the Zoar soils.

Typical pedon of Millrock loamy fine sand, 0 to 7 percent slopes, 0.5 mile northwest of U.S. Highway 340, 110 feet east of river edge, 105 feet west of edge of field:

A1—0 to 12 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; friable; common fine and few medium roots; neutral; abrupt smooth boundary.

B1—12 to 18 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; common fine and few medium roots; neutral; clear smooth boundary.

B2—18 to 26 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few fine, medium, and coarse roots; neutral; clear smooth boundary.

B3—26 to 29 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; few fine roots; neutral; clear wavy boundary.

B4—29 to 34 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; few fine roots; thin silt coatings on sand grains; neutral; abrupt smooth boundary.

B5—34 to 39 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; thin silt coatings on sand grains; few charcoal stains; neutral; clear smooth boundary.

B6—39 to 43 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; thin silt coatings on sand grains; neutral; clear smooth boundary.

C1—43 to 60 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; neutral.

The solum is 30 to 54 inches thick. Depth to bedrock is more than 5 feet. Rounded pebbles 2 millimeters to 2 inches in diameter, mostly sandstone, make up 0 to 10 percent of the A horizon and 0 to 20 percent of the B and C horizons. Reaction in the solum is slightly acid or neutral.

The A horizon has hue of 10YR, value of 3 or 5, and chroma of 3. It is loamy sand or loamy fine sand.

The B horizon has hue of 10YR, value of 4 through 6, and chroma of 3 or 4. It is loamy sand or loamy fine sand.

The C horizon has hue of 10YR, value of 4 through 6, and chroma of 4 or 6. It is loamy sand or sand.

Millrock soils in this survey area are a taxadjunct to the Millrock series because they do not have lamellae and moist value of 5 or 6 in the B horizon. These differences, however, do not affect the use and management of the soils.

Monongahela series

Soils of the Monongahela series are deep and moderately well drained. These soils have a fragipan at a depth of about 24 inches. They developed in old alluvium derived largely from acid sandstone and shale. They are on terraces along the major streams and rivers. Slopes range from 2 to 15 percent.

Monongahela soils are commonly near the Purdy, Berks, and Buchanan soils. Unlike Berks soils, Monongahela soils have a fragipan. Monongahela soils are better drained than the Purdy and Buchanan soils.

Typical pedon of Monongahela loam, 7 to 15 percent slopes, 0.75 mile northwest of Virginia Route 340, 0.8 mile southwest of intersection of Virginia Highways 628 and 629, 210 yards east of Shenandoah River:

Ap1—0 to 5 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; many very fine and fine roots; common very fine and fine pores; mildly alkaline; abrupt wavy boundary.

Ap2—5 to 11 inches; brown (10YR 5/3) loam; weak very fine subangular blocky structure; friable; common fine and very fine roots; many very fine and fine pores; few worm channels and casts; 2 percent angular sandstone fragments up to 1/4 inch in diameter; neutral; gradual wavy boundary.

B1—11 to 15 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and plastic; few fine roots; many fine pores; few worm channels and casts; 2 percent angular sandstone fragments up to 1/4 inch in diameter; neutral; clear wavy boundary.

B2t—15 to 24 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) clay loam; few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many fine pores; few worm channels and casts; 5 percent angular

sandstone fragments up to 2 inches in diameter; thin patchy clay films; very strongly acid; clear wavy boundary.

Bx1—24 to 45 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) clay loam; many coarse distinct light gray (10YR 7/1) mottles; very thick platy structure; firm, brittle, slightly sticky and slightly plastic; many fine pores; 10 percent sandstone fragments up to 2 inches in diameter; very pale brown (10YR 7/3) streaks up to 4 inches thick; strongly acid; gradual wavy boundary.

Bx2—45 to 53 inches; strong brown (7.5YR 5/8) clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; thin platy structure; firm, brittle; many fine and very fine pores; 5 percent sandstone fragments up to 2 inches in diameter; strongly acid; gradual wavy boundary.

C—53 to 60 inches; strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) clay loam; common fine distinct grayish brown (10YR 5/2) mottles; massive; friable; strongly acid.

The solum is 40 to 60 inches thick. The depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 30 inches. The content of sandstone pebbles and cobblestones ranges from 0 to 15 percent above the fragipan, from 0 to 20 percent in the fragipan, and from 0 to 35 percent in the substratum. Reaction is very strongly acid or strongly acid unless the soil is limed.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 3. It is silt loam, loam, or fine sandy loam or a cobbly analog.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. Low chroma mottles are in the lower part of the Bt horizon in some pedons. Texture is clay loam, sandy clay loam, or loam.

The Bx horizon has hue of 7.5YR through 2.5Y, value of 5, and chroma of 2 through 8. It is loam, clay loam, or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 through 8. It is clay loam or its gravelly or cobbly analog. Some pedons are underlain by stratified layers of sand, silt, pebbles, or cobblestones.

Montalto series

Soils of the Montalto series are deep and well drained. These soils are on uplands. They formed in the weathered products of Catoctin greenstone. Slopes range from 7 to 65 percent.

Montalto soils are commonly near Myersville, Chester, Hawksbill, and Lew soils. Montalto soils have more clay in the subsoil than Myersville and Chester soils, and they have fewer rock fragments in the profile than Lew and Hawksbill soils.

Typical pedon of Montalto gravelly loam in an area of Myersville and Montalto very stony soils, 15 to 25 percent slopes, 37 feet southeast of gravel road and 60 feet northeast of power pole, Smithsonian Zoological Park:

Ap—0 to 6 inches; reddish brown (5YR 4/3) gravelly loam; moderate fine subangular blocky structure; friable; many very fine and fine roots; few fine pores; 15 percent angular greenstone fragments up to 8 inches in diameter; neutral; abrupt smooth boundary.

B21t—6 to 20 inches; reddish brown (5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; many fine pores; 10 percent angular greenstone fragments up to 10 inches in diameter; neutral; clear irregular boundary.

B22t—20 to 37 inches; red (2.5YR 4/6) clay; common fine distinct yellowish red (5YR 5/8) mottles; moderate medium and coarse subangular blocky structure; friable; few fine roots; thin discontinuous clay films; 10 percent angular greenstone fragments up to 10 inches in diameter; slightly acid; clear smooth boundary.

B23t—37 to 53 inches; yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) silty clay; weak fine subangular blocky structure; friable; few fine roots; common fine pores; thin patchy clay films; common fine black (10R 2/1) stains; slightly acid; clear wavy boundary.

C—53 to 60 inches; red (2.5YR 4/6) and strong brown (7.5YR 5/8) weathered greenstone that crushes to silt loam; few fine prominent red (10R 4/8) mottles; massive; friable; few fine roots; many fine prominent black (10YR 2/1) stains; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. Greenstone fragments, ranging in size from gravel to boulders, make up 0 to 25 percent of the A horizon and 0 to 15 percent of the B and C horizons. Reaction in the solum ranges from very strongly acid through slightly acid unless the soil is limed.

The A horizon has hue of 5YR, value of 3 or 4, and chroma of 3. It is loam or gravelly loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 4 through 8. It is silty clay loam, silty clay, or clay.

The C horizon has a wide range of colors and contains mottles in many pedons. It is silt loam or silty clay loam.

Myersville series

Soils of the Myersville series are deep and well drained. These soils are on uplands. They formed in

material weathered from greenstone. Slopes range from 7 to 65 percent.

Myersville soils are commonly near Catoctin, Montalto, and Lew soils. Myersville soils have less clay in the profile than Montalto soils. Myersville soils are deeper to bedrock than Catoctin soils and contain fewer coarse fragments than Catoctin and Lew soils.

Typical pedon of Myersville silt loam, 7 to 15 percent slopes, 0.5 mile south of U.S. Highway 522, 0.7 mile east of Virginia Route 604, Smithsonian Zoological Park:

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; friable; many fine and medium roots; many fine and medium pores; slightly acid; abrupt smooth boundary.

B1—6 to 10 inches; dark brown (7.5YR 4/4) silty clay loam; weak fine subangular blocky and weak medium granular structure; friable; few fine roots; few fine and medium pores; medium acid; abrupt smooth bundary.

B21t—10 to 16 inches; dark brown (7.5YR 4/4) gravelly silty clay loam; reddish brown (5YR 4/4) mottles; moderate medium subangular blocky structure; firm, slightly sticky and nonplastic; many fine roots; many fine and medium pores; thick continuous clay films; 25 percent greenstone fragments up to 4 inches in diameter; medium acid; clear wavy boundary.

B22t—16 to 25 inches; yellowish red (5YR 5/6) and dark brown (7.5YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; common fine and medium roots; few medium pores; thick continuous clay films; common black stains; 10 percent greenstone fragments up to 4 inches in diameter; strongly acid; clear wavy boundary.

B23t—25 to 31 inches; yellowish red (5YR 4/6) and dark brown (7.5YR 4/4) gravelly silty clay loam; strong fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few medium roots; thin patchy clay films; common black stains; 25 percent greenstone fragments up to 4 inches in diameter; very strongly acid; abrupt smooth boundary.

B3t—31 to 40 inches; yellowish red (5YR 4/6) and dark brown (7.5YR 4/4) gravelly silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and yellow (2.5Y 7/6) mottles; moderate medium subangular blocky structure; firm; few medium roots; few fine pores; thick continuous clay films; 25 percent greenstone fragments up to 2 1/2 inches in diameter; strongly acid; clear wavy boundary.

C1—40 to 52 inches; light olive brown (2.5Y 5/4) and red (2.5YR 5/8) silty clay loam; massive; firm, slightly sticky and slightly plastic; few fine and medium roots; many black stains between plates; strongly acid; clear wavy boundary.

C2—52 to 60 inches; red (2.5YR 4/6), yellowish brown (10YR 5/6), and olive yellow (2.5Y 6/6) silt loam; few fine distinct gray (5YR 6/1) mottles; massive; firm, slightly sticky and slightly plastic; common black stains; strongly acid; clear wavy boundary.

The solum is 30 to 40 inches thick. Depth to bedrock is more than 5 feet. Greenstone fragments make up 0 to 10 percent of the A horizon, 0 to 30 percent of the upper part of the B horizon, 0 to 40 percent of the lower part of the B horizon, and 0 to 50 percent of the C horizon. Reaction is medium acid to very strongly acid unless the soil is limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or 4.

The B horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 6. It is silt loam, clay loam, silty clay loam, clay, or silty clay or a gravelly analog.

The C horizon has hue of 2.5YR through 2.5Y, value of 4 through 6, and chroma of 4 through 8. It is silt loam or silty clay loam or a gravelly analog.

Newark series

Soils of the Newark series are deep and somewhat poorly drained. These soils formed in recently deposited alluvium on flood plains. Slopes are 0 to 2 percent.

Newark soils are commonly near Chagrin, Purdy, and Zoar soils. Newark soils are more poorly drained than Chagrin and Zoar soils and have less clay and are better drained than the Purdy soils.

Typical pedon of Newark silt loam, 125 yards north of river, 0.5 mile southeast of the end of Virginia Route 673:

Ap1—0 to 5 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; common fine discontinuous pores; slightly acid; clear smooth boundary.

Ap2—5 to 10 inches; dark brown (10YR 4/3) silt loam; many fine prominent strong brown (7.5YR 5/6) and few fine faint very dark grayish brown (10YR 3/2) mottles; weak fine and medium subangular blocky structure; friable; common fine roots; few fine discontinuous pores; slightly acid; abrupt wavy boundary.

B21—10 to 22 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; many fine discontinuous pores; common worm channels; neutral; clear wavy boundary.

B22—22 to 32 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct brown (7.5YR

4/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, sticky and plastic; few fine roots; many fine discontinuous pores; neutral; clear wavy boundary.

B23—32 to 44 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky and slightly plastic; few fine roots; many fine discontinuous pores; few fine manganese concretions; neutral; clear wavy boundary.

C—44 to 60 inches; dark grayish brown (10YR 4/2) silty clay loam; many medium distinct brown (7.5YR 4/4) mottles; massive; friable, sticky and plastic; few fine roots; few fine discontinuous pores; common manganese concretions and stains; common silt coatings on faces of peds; neutral.

The solum is 24 to 44 inches thick. Depth to bedrock is more than 5 feet. Reaction ranges from medium acid to mildly alkaline throughout the soil. Some pedons have buried A and B horizons.

The A horizon has hue of 7.5YR through 2.5Y, value of 4, and chroma of 2 through 4. It is loam or silt loam.

The B horizon has hue of 10YR or 2.5Y, value of 4, and chroma of 2 through 4. It is mottled with shades of brown or gray.

The C horizon has color and texture similar to those of the B horizon.

Purdy series

Soils of the Purdy series are deep and poorly drained. These soils formed in alluvium and are on terraces along the larger streams. Slopes are 0 to 2 percent.

Purdy soils are commonly near Hawksbill, Newark, and Zoar soils. Purdy soils are not as well drained as Hawksbill, Newark, and Zoar soils.

Typical pedon of Purdy loam, 0.5 mile north of Virginia Route 634, 250 yards west of Virginia Route 622:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure parting to weak fine granular; friable, slightly sticky and nonplastic; common fine roots; many fine pores; slightly acid; abrupt smooth boundary.

B1tg—6 to 12 inches; grayish brown (2.5Y 5/2) clay loam; few fine distinct strong brown (7.5YR 5/6) and many medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure; friable; few fine roots; common fine roots; common fine pores; thick patchy clay films; many worm channels; strongly acid; clear smooth boundary.

B21tg—12 to 20 inches; grayish brown (2.5Y 5/2) silty clay; common medium prominent strong brown (7.5YR 5/8) mottles; strong medium prismatic structure parting to strong coarse blocky; firm, sticky and slightly plastic; few fine roots; few fine pores; thick patchy clay films; strongly acid; clear smooth boundary.

B22tg—20 to 32 inches; grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; strong coarse blocky structure; firm, sticky and slightly plastic; many fine and medium continuous pores; many thin clay films and clay bridging on sand grains; very strongly acid; gradual wavy boundary.

C1—32 to 40 inches; yellowish red (5YR 5/8) sandy clay loam; many prominent light gray (5Y 7/1) mottles; massive; very firm, slightly sticky and nonplastic; many fine pores; clay bridging on sand grains; strongly acid; gradual wavy boundary.

C2g—40 to 50 inches; gray (5Y 6/1) sandy clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; firm, slightly sticky and slightly plastic; thin continuous clay films; very strongly acid; gradual wavy boundary.

C3g—50 to 61 inches; gray (5Y 6/1) sandy clay loam; common fine prominent yellowish red (5YR 5/8) and distinct yellowish brown (10YR 5/8) mottles; massive; firm, slightly sticky and slightly plastic; few fine pores; strongly acid.

The solum is 28 to 50 inches thick. Depth to bedrock is more than 5 feet. Reaction ranges from extremely acid through strongly acid in unlimed areas.

The A horizon is neutral with value of 4 or 5 or has hue of 10YR through 5Y, value of 4 or 5, and chroma of 1 or 2. It is silt loam, loam, or silty clay loam.

The B horizon is neutral with value of 4 or 5 or has hue of 10YR through 5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay, clay loam, clay, or silty clay loam.

The C horizon is neutral with value of 4 through 6 or has hue of 5YR through 5Y, value of 4 through 6, and chroma of 1 through 8. It is silty clay, sandy clay loam, or clay loam.

In this survey area the Purdy soils are a taxadjunct to the Purdy series because the C horizon is yellowish red and contains less clay in the particle size control section and C horizon than is defined for the series.

Rigley series

Soils of the Rigley series are deep and well drained. These soils are on uplands. They formed in colluvial material derived from sandstone and the underlying residuum of shale on Massanutten Mountain. Slopes range from 15 to 60 percent.

Rigley soils are commonly near Berks, Weikert, and Buchanan soils. Rigley soils have fewer coarse fragments than Berks soils and are deeper to bedrock than Weikert soils. Rigley soils are better drained than the Buchanan soils and do not have a fragipan.

Typical pedon of Rigley very stony sandy loam in an area of Rigley-Weikert-Berks very stony complex, 15 to 25 percent slopes, 25 feet west of Veach Gap Trail, 0.9 mile south of Virginia Route 613:

O1—4 to 2 inches; loose leaves and twigs.
O2—2 inches to 0; very dark brown (10YR 2/2) organic matter.
A1—0 to 6 inches; dark brown (10YR 3/3) very stony sandy loam; moderate medium granular structure; friable, nonsticky and nonplastic; common fine and medium and few coarse roots; 25 percent semirounded sandstone fragments up to 18 inches in diameter; strongly acid; abrupt smooth boundary.
B21t—6 to 12 inches; light yellowish brown (10YR 6/4) sandy loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; many fine discontinuous pores, few thin patchy clay films; 10 percent angular sandstone fragments up to 10 inches long; strongly acid; clear smooth boundary.
B22t—12 to 20 inches; brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) sandy loam; strong medium and coarse subangular blocky structure; friable, slightly sticky and nonplastic; common fine discontinuous pores; few thin patchy clay films; 10 percent angular sandstone fragments up to 5 inches long; strongly acid; clear wavy boundary.
B23t—20 to 41 inches; strong brown (7.5YR 5/6) flaggy sandy loam; strong coarse subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; thick patchy clay films; 20 percent angular sandstone fragments up to 15 inches long; strongly acid; clear smooth boundary.
IIC—41 to 60 inches; strong brown (7.5YR 5/6) flaggy loam; massive; friable, sticky and plastic; few fine roots; common fine and medium discontinuous pores; 30 percent highly weathered shale fragments up to 12 inches long; strongly acid.
IICr—60 inches; light yellowish brown (10YR 6/4) highly weathered shale.

The solum ranges in thickness from 40 to 60 inches or more. Depth to bedrock is more than 5 feet. Depth to lithologic discontinuity is 40 to 60 inches. Angular or flagstone shaped sandstone fragments make up 5 to 35 percent of the A and B horizons. Reaction ranges from extremely acid through strongly acid in unlimed areas.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam or a cobbly, flaggy, or very stony analog.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. Some pedons have shades of red, brown, or gray below a depth of 40 inches. This horizon is sandy loam or loam or a cobbly or flaggy analog.

The IIC horizon has colors similar to those of the B horizon. This horizon is flaggy or very flaggy sandy loam, loam, or clay loam. Sandstone fragments make up 25 to 70 percent of the IIC horizon.

Sequoia series

Soils of the Sequoia series are deep and well drained. These soils are on uplands. They formed in the weathered products of shale. Slopes range from 2 to 15 percent.

Sequoia soils are commonly near Berks, Weikert, and Clearbrook soils. Unlike Berks and Weikert soils, Sequoia soils are deep to bedrock and have an argillic horizon. Sequoia soils are better drained than the Clearbrook soils.

Typical pedon of Sequoia silt loam, 2 to 7 percent slopes, 150 yards north of Virginia Route 619, in roadbank on east side of Virginia Route 618:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine and medium roots; many fine vertical pores; slightly acid; gradual smooth boundary.
A2—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak very fine platy structure; friable; common fine and medium roots; many fine vertical pores; very strongly acid; gradual smooth boundary.
B1—10 to 14 inches; yellowish brown (10YR 5/8) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine and medium roots; few fine pores along faces of peds; 5 percent highly weathered shale fragments up to 3 inches long; streaks of strong brown (7.5YR 5/8) on faces of peds; strongly acid; gradual smooth boundary.
B21t—14 to 22 inches; yellowish brown (10YR 5/8) silty clay; moderate medium subangular blocky structure; firm; few medium roots; few fine pores; thin clay films on faces of peds; 5 percent highly weathered shale fragments up to 5 inches long; strongly acid; clear smooth boundary.
B22t—22 to 26 inches; yellowish brown (10YR 5/6) silty clay; strong medium subangular blocky structure; firm; few medium roots; few medium pores; thick patchy clay films; 5 percent highly weathered shale fragments up to 5 inches in length; streaks of strong brown (7.5YR 5/6) on faces of peds; very strongly acid; clear wavy boundary.
B23t—26 to 38 inches; brownish yellow (10YR 6/6) shaly clay; common fine distinct reddish brown (2.5YR 5/4) mottles; strong medium angular blocky structure; firm; few fine root channels; few fine and

very fine pores; 25 percent weathered shale fragments up to 3 inches in length; very strongly acid; gradual wavy boundary.
Cr—38 to 60 inches; yellowish brown (10YR 5/6) and red (2.5YR 5/6) weathered shale with streaks of light gray (10YR 7/1) weathered shale; thin seams of silt loam coating shale fragments.

The solum is 20 to 40 inches thick. Depth to hard shale is commonly more than 5 feet. Shale fragments up to 4 inches long make up 0 to 10 percent of the A horizon and 5 to 25 percent of the B horizon. Reaction is very strongly acid or strongly acid in unlimed areas.

The A horizon has hue of 10YR, value of 4 and 5, and chroma of 3 through 5.

The B horizon has hue of 2.5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. It is silty clay or clay or a shaly analog. The B1 horizon includes silty clay loam.

Some pedons contain a C horizon, which has hue, value, and chroma similar to those of the B horizon. It is silt loam or silty clay loam or a shaly or very shaly analog.

Unison series

Soils of the Unison series are deep and well drained. They formed in alluvium washed from uplands underlain by sandstone and shale. Unison soils are on broad terraces along the larger streams. Slopes range from 2 to 25 percent.

Unison soils are commonly near Lodi, Monongahela, and Zoar soils. Unlike the Unison soils, Lodi soils developed in material weathered from limestone. Unison soils do not have the fragipan of the Monongahela soils and are better drained than the Monongahela and Zoar soils.

Typical pedon of Unison loam, 2 to 7 percent slopes, 50 feet west of Virginia Route 679 and 300 yards south of Virginia Route 619:

Ap—0 to 7 inches; yellowish brown (10YR 5/6) loam; weak fine granular structure; friable; many fine roots; few fine pores; neutral; abrupt smooth boundary.
B1t—7 to 19 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; few fine roots; few fine pores; slightly acid; gradual smooth boundary.
B21t—19 to 28 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) clay loam; moderate fine subangular blocky structure; firm; few fine and medium roots; few fine pores; few thin patchy clay films; 10 percent weathered shale fragments; strongly acid; clear smooth boundary.
B22t—28 to 39 inches; strong brown (7.5YR 5/6) clay loam; weak medium platy structure parting to weak very fine blocky; firm; few fine and medium roots; thin patchy clay films; 10 percent weathered shale fragments; strongly acid; clear smooth boundary.
IIB23t—39 to 47 inches; dark yellowish brown (10YR 4/4) cobbly clay loam; weak thick platy structure; firm; few fine roots; medium patchy clay films; 35 percent rounded weathered sandstone fragments; very strongly acid; clear smooth boundary.
IIB24t—47 to 60 inches; multicolored yellowish brown (10YR 5/4) and dark red (2.5YR 3/6) cobbly clay loam; moderate thick platy structure; firm; 20 percent rounded weathered sandstone fragments; very strongly acid.

The solum ranges in thickness from 40 to 60 inches or more. Depth to bedrock is more than 5 feet. Rounded sandstone pebbles and cobblestones make up 0 to 30 percent of the A horizon, 0 to 35 percent of the B horizon, and 15 to 65 percent of the IIB horizon. The soil is very strongly acid through medium acid in unlimed areas.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam or loam or a cobbly analog.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is clay loam or clay or a cobbly analog. The B1 horizon includes silt loam.

The IIB horizon is similar in color to the B2 horizon. It is gravelly, very gravelly, cobbly, or very cobbly clay loam or clay.

Some pedons have a IIC horizon that is similar in color and texture to the IIB horizon.

Weikert series

Soils of the Weikert series are shallow and well drained. These soils are on uplands. They formed in material weathered from acid shale or interbedded shale, siltstone, and sandstone. Slopes range from 7 to 65 percent.

Weikert soils are commonly near Berks, Blairton, and Sequoia soils. Weikert soils are shallower to bedrock than Berks, Blairton, and Sequoia soils, have less clay in the subsoil than the Sequoia soils, and are better drained than the Blairton soils.

Typical pedon of Weikert shaly silt loam in an area of Weikert-Berks shaly silt loams, 15 to 25 percent slopes, 50 yards north of Virginia Route 612, 0.2 mile west of Virginia Route 626:

O1—1 inch to 0; partially decayed leaf litter and twigs.
A1—0 to 3 inches; brown (10YR 5/3) shaly silt loam; weak fine granular structure; friable; many fine and medium roots; few fine pores; 35 percent shale fragments up to 3 inches long; very strongly acid; abrupt smooth boundary.
B—3 to 9 inches; yellowish brown (10YR 5/4) very shaly

silt loam; weak fine subangular blocky structure; friable; common medium and coarse roots; 50 percent shale fragments up to 8 inches long; strongly acid; clear irregular boundary.

C—9 to 15 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak fine subangular blocky structure; friable, few coarse roots; few fine pores; 70 percent shale fragments up to 12 inches long; strongly acid; clear discontinuous boundary.

R—15 inches; yellowish brown (10YR 5/4), olive brown (2.5Y 4/4), and light olive brown (2.5Y 5/4) hard shale and sandstone bedrock.

The solum is 8 to 20 inches thick. Depth to bedrock is 12 to 20 inches. Coarse fragments of shale, siltstone, and fine-grained sandstone make up 20 to 50 percent of the A horizon, 30 to 65 percent of the B horizon, and 60 to 85 percent of the C horizon. Reaction ranges from very strongly acid through medium acid in unlimed areas.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 6, and chroma of 2 through 6.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. It is very shaly or very channery silt loam or loam.

The C horizon is similar in color to the B horizon. It is very shaly or very channery silt loam or loam.

Zoar series

Soils of the Zoar series are deep and moderately well drained. These soils are on terraces and uplands. They formed in colluvium and are underlain by weathered acid shale interbedded with lenses of sandstone. Slopes range from 0 to 7 percent.

Zoar soils are commonly near Berks, Weikert, and Sequoia soils. Zoar soils are not as well drained as the Berks, Weikert, and Sequoia soils, and are deeper to bedrock than the Weikert and Berks soils.

Typical pedon of Zoar silt loam, 0 to 7 percent slopes, Virginia Route 611, 0.9 mile south of Virginia Route 635, 200 yards northwest of barn:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B1—9 to 15 inches; yellowish brown (10YR 5/6) silt loam; few fine distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; very friable; few fine roots; few worm channels; slightly acid; clear smooth boundary.

B21t—15 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky; many thin discontinuous clay films along faces of peds; few fine roots; strongly acid; clear smooth boundary.

B22t—23 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct strong brown (7.5YR 5/6) and reddish brown (2.5YR 5/4) mottles; moderate coarse subangular blocky structure; friable, slightly sticky; many thin discontinuous clay films along faces of peds; few fine roots; strongly acid; abrupt wavy boundary.

B23t—28 to 39 inches; strong brown (7.5YR 5/6) silty clay loam; many medium prominent light olive brown (2.5Y 5/4) and gray (5Y 5/1) mottles; weak subangular blocky structure; firm, slightly plastic; thin continuous clay films; strongly acid; abrupt smooth boundary.

IIC—39 to 65 inches; brown (7.5YR 5/4) and yellowish brown (10YR 5/4) clay loam; many prominent light olive brown (2.5Y 5/4) mottles; massive; firm; 10 percent weathered dark red (2.5YR 3/6) sandy shale; thin discontinuous pockets and layers consisting of 30 percent gray (5Y 6/1) shale and sandstone; very strongly acid.

The solum is 30 to 45 inches thick. Depth to bedrock is more than 5 feet. Shale and sandstone fragments make up less than 5 percent of the solum. Reaction is very strongly acid or strongly acid in unlimed areas.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 6 or 8. It is silty clay loam or silty clay. The B1 horizon includes silt loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4. It is clay, clay loam, or a gravelly or channery analog.

Formation of the soils

Soils are formed through the interaction of five major factors. These factors are climate, plant and animal life, parent material, relief, and time. The relative influence of each factor varies from place to place. Local variations in soils are a result of differences in kind of parent material and in topography and drainage. In some places, one factor may dominate the formation of a soil and determine most of its properties. However, it is the combined action of the five factors that determines the character of each soil.

Climate

The climate of Warren County is a humid continental type that is marked by extreme seasonal temperature changes. Average annual precipitation is about 38 inches, and average air temperature is about 53 degrees F. Adequate precipitation and warm temperature have provided conditions for the rapid decomposition of organic matter and limited the accumulation of organic matter in the surface layer of the soils. For more detailed information on climate see the section under "General nature of the survey area."

Plant and animal life

All living organisms are important in soil formation. These include vegetation, animals, bacteria, and fungi. Vegetation is generally responsible for the amount of organic matter, color of the surface layer, and the amount of nutrients available to plants. Earthworms, cicadas, and burrowing animals help to keep the soil open and porous. Bacteria and fungi decompose the vegetation, thus releasing nutrients for plant food. In Warren County, the native forests have had more influence on soil formation than any other living organisms. Man, however, has greatly changed the surface layer physically and chemically where he has cleared the forests and cultivated the soil. The most important changes brought about by man are the mixing of the upper layers of the soil to form a plow layer; accelerated erosion caused by cultivating strongly sloping soils; and changes in the content of plant nutrients, especially in the upper layers, caused by liming and fertilization.

Parent material

Parent material is the unconsolidated mass from which the soils are formed. It is largely responsible for the mineralogical and chemical composition of the soil and the rate at which soil-forming processes take place.

In Warren County, the soils have formed in three kinds of parent material: (1) residual, (2) alluvial, and (3) colluvial. Some of the residual parent materials are residuum of shale, siltstone, limestone, sandstone, and greenstone. Soils that formed in residuum of shale, limestone, and greenstone are the most extensive in the county and have a wide range of characteristics. Soils that formed in residuum of shale and siltstone include Berks and Weikert soils. Soils that formed in residuum of limestone typically have a silty surface layer and a clayey subsoil. Examples are the Lodi and Carbo soils. The coarse textured Drall soils formed in residuum of sandstone. Soils that formed in residuum of greenstone include the Myersville and Montalto soils.

Alluvial material is commonly of recent origin and is currently being deposited. Soils that formed in alluvium vary widely in texture and development. Examples are Buckton, Chagrin, Craigsville, and Newark soils.

Colluvial parent materials are dominantly along lower mountain slopes. They are primarily coarse textured or medium textured. Examples of soils that formed in colluvium are Rigley and Buchanan soils.

Relief

The underlying geologic formations, the geologic history of the general region, and the effects of dissection by rivers and streams largely determine the relief of an area. Relief influences soil formation through its effect on drainage, erosion, temperature, and plant cover.

Warren County is in the Appalachian and Valley Ridge and the Blue Ridge physiographic provinces and is within the Shenandoah River drainage system. The county is bordered by the Massanutten Mountain system on the west and the Blue Ridge Mountain system on the east. These mountain systems are underlain by resistant rocks such as sandstone, metabasalts, and quartzites. The valley relief is also affected by the underlying geology. The shale and limestone form areas that have the least relief.

Most upland areas are well drained. Soils on terraces and flood plains range from well drained to poorly drained.

Time

The formation of soils requires time for changes to take place in the parent materials. Young soils have little or no horizon development. Old soils have strongly developed horizons.

The soils that formed in recent alluvium have been in place only a relatively short time and show little or no development. The oldest soils in Warren County are those formed in residuum of easily weathered carbonate rock. In general, these soils are on the less sloping, relatively stable positions.

References

(1) American Association of State Highway [and Transportation Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vols., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, pt. 19, 464 pp., illus.

(3) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(4) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.
R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be

directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. The method of irrigation commonly used in Warren County is sprinkler irrigation. Under this method, the water is forced through pipes and is sprayed over the soil surface.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1952-78 at Berryville, Virginia]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days[1]	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	41.0	20.5	30.8	68	-9	39	2.47	1.25	3.52	6	9.0
February	44.6	22.8	33.7	73	-2	39	2.21	1.05	3.21	5	7.6
March	54.2	30.3	42.3	82	9	169	3.07	2.05	3.99	8	6.2
April	66.3	39.7	53.0	90	21	390	3.30	1.92	4.53	8	.6
May	75.4	48.7	62.1	92	28	685	3.53	1.96	4.92	8	.0
June	83.0	57.2	70.1	96	39	903	3.94	1.99	5.62	7	.0
July	86.7	61.5	74.2	98	47	1,060	3.58	1.79	5.13	7	.0
August	85.5	60.6	73.1	97	44	1,026	3.96	2.03	5.63	7	.0
September	78.8	53.4	66.2	97	33	786	3.08	1.55	4.41	5	.0
October	67.6	41.4	54.5	86	22	450	3.03	1.37	4.47	5	.0
November	55.6	32.9	44.2	79	12	153	2.84	1.28	4.16	6	1.9
December	44.3	24.4	34.3	70	3	62	2.63	1.15	3.89	6	5.3
Yearly	65.3	41.1	53.2	100	-9	5,762	37.64	32.34	42.88	78	30.6

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1952-78 at Berryville, Virginia]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 12	May 30
2 years in 10 later than--	April 29	May 7	May 23
5 years in 10 later than--	April 19	April 26	May 9
First freezing temperature in fall:			
1 year in 10 earlier than--	October 12	October 4	September 21
2 years in 10 earlier than--	October 18	October 9	September 25
5 years in 10 earlier than--	October 29	October 19	October 4

TABLE 3.--GROWING SEASON

[Recorded in the period 1952-78 at Berryville, Virginia]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	167	152	121
8 years in 10	176	160	130
5 years in 10	192	175	147
2 years in 10	208	190	164
1 year in 10	217	198	172

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1B	Berks shaly silt loam, 2 to 7 percent slopes	4,233	3.0
1C	Berks shaly silt loam, 7 to 15 percent slopes	4,858	3.5
1D	Berks shaly silt loam, 15 to 25 percent slopes	854	0.6
2B	Blairton silt loam, 2 to 7 percent slopes	1,308	0.9
2C	Blairton silt loam, 7 to 15 percent slopes	303	0.2
3C	Buchanan fine sandy loam, 7 to 15 percent slopes	802	0.6
4C	Buchanan very stony fine sandy loam, 7 to 15 percent slopes	365	0.3
5	Buckton silt loam	1,015	0.7
6C	Carbo-Endcav silty clay loams, very rocky, 7 to 15 percent slopes	1,000	0.7
7C	Carbo-Endcav-Rock outcrop complex, 7 to 15 percent slopes	918	0.7
8C	Cataska slaty silt loam, 7 to 15 percent slopes	245	0.2
8D	Cataska slaty silt loam, 15 to 25 percent slopes	1,331	1.0
8E	Cataska slaty silt loam, 25 to 65 percent slopes	2,318	1.7
9	Chagrin fine sandy loam	2,402	1.7
10C	Chester loam, 7 to 15 percent slopes	1,915	1.4
10D	Chester loam, 15 to 25 percent slopes	1,745	1.2
10E	Chester loam, 25 to 65 percent slopes	649	0.5
11D	Chester-Manor very stony complex, 15 to 25 percent slopes	1,399	1.0
11E	Chester-Manor very stony complex, 25 to 65 percent slopes	9,361	6.7
12D	Chilhowie silty clay loam, rocky, 15 to 25 percent slopes	664	0.5
13B	Clearbrook shaly silt loam, 2 to 7 percent slopes	557	0.4
13C	Clearbrook shaly silt loam, 7 to 15 percent slopes	546	0.4
14	Craigsville cobbly sandy loam	373	0.3
15E	Dekalb channery loam, 25 to 65 percent slopes	3,832	2.7
16F	Drall-Rubble land complex, 35 to 70 percent slopes	1,295	0.9
17B	Dyke loam, 2 to 7 percent slopes	481	0.3
17C	Dyke loam, 7 to 15 percent slopes	1,260	0.9
18B	Endcav silt loam, 2 to 7 percent slopes	681	0.5
18C	Endcav silt loam, 7 to 15 percent slopes	411	0.3
19B	Hawksbill cobbly loam, 2 to 7 percent slopes	1,871	1.3
20B	Hawksbill very cobbly loam, 2 to 7 percent slopes	450	0.3
20C	Hawksbill very cobbly loam, 7 to 15 percent slopes	1,276	0.9
21D	Lew channery loam, 7 to 25 percent slopes	989	0.7
22E	Lew very stony loam, 25 to 65 percent slopes	1,052	0.8
23B	Lodi silt loam, 2 to 7 percent slopes	2,708	1.9
23C	Lodi silt loam, 7 to 15 percent slopes	4,437	3.2
23D	Lodi silt loam, 15 to 25 percent slopes	2,764	2.0
24B	Lodi silt loam, rocky, 2 to 7 percent slopes	328	0.2
24C	Lodi silt loam, rocky, 7 to 15 percent slopes	1,277	0.9
24D	Lodi silt loam, rocky, 15 to 25 percent slopes	537	0.4
25C	Lodi silt loam, very rocky, 7 to 15 percent slopes	1,208	0.9
25D	Lodi silt loam, very rocky, 15 to 25 percent slopes	962	0.7
26C	Lodi-Rock outcrop complex, 2 to 15 percent slopes	721	0.5
26E	Lodi-Rock outcrop complex, 15 to 45 percent slopes	1,742	1.2
27B	Millrock loamy fine sand, 0 to 7 percent slopes	570	0.4
28B	Monongahela loam, 2 to 7 percent slopes	962	0.7
28C	Monongahela loam, 7 to 15 percent slopes	452	0.3
29C	Montalto loam, 7 to 15 percent slopes	1,120	0.8
30C	Myersville silt loam, 7 to 15 percent slopes	788	0.6
30D	Myersville silt loam, 15 to 25 percent slopes	656	0.5
31C	Myersville-Catoctin very stony silt loams, 7 to 15 percent slopes	778	0.6
31D	Myersville-Catoctin very stony silt loams, 15 to 25 percent slopes	1,577	1.1
31E	Myersville-Catoctin very stony silt loams, 25 to 65 percent slopes	8,125	5.8
32C	Myersville and Montalto very stony soils, 7 to 15 percent slopes	2,235	1.6
32D	Myersville and Montalto very stony soils, 15 to 25 percent slopes	8,636	6.2
32E	Myersville and Montalto very stony soils, 25 to 65 percent slopes	8,155	5.8
33	Newark silt loam	897	0.6
34	Pits, quarries, and dumps	587	0.4
35	Purdy loam	630	0.4
36E	Rigley very stony sandy loam, 25 to 60 percent slopes	1,396	1.0
37D	Rigley-Weikert-Berks very stony complex, 15 to 25 percent slopes	2,868	2.0
38B	Sequoia silt loam, 2 to 7 percent slopes	1,342	1.0
38C	Sequoia silt loam, 7 to 15 percent slopes	973	0.7
39B	Unison loam, 2 to 7 percent slopes	995	0.7
39C	Unison loam, 7 to 15 percent slopes	2,661	1.9
39D	Unison loam, 15 to 25 percent slopes	1,427	1.0
40C	Unison cobbly loam, 7 to 15 percent slopes	321	0.2
41C	Weikert-Berks shaly silt loams, 7 to 15 percent slopes	1,020	0.7
41D	Weikert-Berks shaly silt loams, 15 to 25 percent slopes	4,161	3.0

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
41E	Weikert-Berks shaly silt loams, 25 to 65 percent slopes	13,333	9.4
42B	Zoar silt loam, 0 to 7 percent slopes	2,455	1.8
	Water	1,537	1.1
	Total	140,100	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM*
1B---- Berks	80	16	35	50	3.5	3.0	6.5
1C---- Berks	75	15	35	50	3.0	2.5	5.5
1D---- Berks	70	14	30	45	3.0	2.5	5.5
2B---- Blairton	75	15	35	50	---	2.5	5.0
2C---- Blairton	70	14	30	45	---	2.0	4.0
3C---- Buchanan	90	18	35	50	---	3.0	5.0
4C---- Buchanan	---	---	---	---	---	---	3.5
5---- Buckton	130	26	55	80	5.5	3.5	8.0
6C---- Carbo-Endcav	---	---	---	---	---	---	3.5
7C---- Carbo-Endcav-Rock outcrop	---	---	---	---	---	---	3.0
8C, 8D, 8E---- Cataska	---	---	---	---	---	---	2.0
9---- Chagrin	115	19	40	65	---	4.5	6.5
10C---- Chester	125	25	45	60	4.5	3.5	5.5
10D---- Chester	110	22	40	55	4.0	3.0	4.5
10E---- Chester	---	---	---	---	---	---	4.0
11D---- Chester-Manor	---	---	---	---	---	---	4.0
11E---- Chester-Manor	---	---	---	---	---	---	3.0
12D---- Chilhowie	---	---	---	---	---	---	3.0
13B---- Clearbrook	70	15	35	50	---	3.0	6.5
13C---- Clearbrook	65	14	30	45	---	2.5	5.5
14---- Craigsville	70	12	25	40	2.0	1.5	4.5

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM*
15E---------- Dekalb	---	---	---	---	---	---	2.0
16F---------- Drall-Rubble land	---	---	---	---	---	---	---
17B, 17C---------- Dyke	125	25	50	80	5.0	5.5	9.0
18B---------- Endcav	110	22	45	60	5.0	3.5	5.5
18C---------- Endcav	100	20	40	55	4.5	3.0	5.0
19B---------- Hawksbill	80	15	40	55	3.0	2.0	4.5
20B, 20C---------- Hawksbill	---	---	---	---	---	---	4.0
21D---------- Lew	90	15	35	50	3.5	2.5	6.1
22E---------- Lew	---	---	---	---	---	---	4.5
23B---------- Lodi	135	27	50	80	4.5	4.0	6.5
23C---------- Lodi	130	26	45	75	4.5	3.5	6.0
23D---------- Lodi	90	18	40	65	4.5	3.5	5.0
24B---------- Lodi	125	25	40	60	4.5	4.0	5.0
24C---------- Lodi	120	24	35	55	4.5	3.5	4.5
24D---------- Lodi	80	16	40	50	4.5	3.5	4.0
25C---------- Lodi	90	18	35	45	4.5	3.5	4.0
25D---------- Lodi	80	16	30	40	4.5	3.5	3.5
26C---------- Lodi-Rock outcrop	---	---	---	---	---	---	3.5
26E---------- Lodi-Rock outcrop	---	---	---	---	---	---	3.0
27B---------- Millrock	70	14	30	50	3.0	2.0	6.0
28B---------- Monongahela	110	22	40	55	---	3.0	6.5
28C---------- Monongahela	90	18	35	50	---	3.0	6.0
29C---------- Montalto	125	25	45	60	5.0	3.5	5.5

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM*
30C---------- Myersville	125	25	50	80	5.0	3.5	7.0
30D---------- Myersville	110	22	45	55	4.5	3.0	6.0
31C, 31D---------- Myersville-Catoctin	---	---	---	---	---	---	5.2
31E---------- Myersville-Catoctin	---	---	---	---	---	---	3.5
32C---------- Myersville and Montalto	---	---	---	---	---	---	4.6
32D---------- Myersville and Montalto	---	---	---	---	---	---	4.5
32E---------- Myersville and Montalto	---	---	---	---	---	---	4.0
33---------- Newark	100	20	---	---	---	4.5	8.5
34. Pits							
35---------- Purdy	80	16	---	---	---	2.5	5.5
36E---------- Rigley	---	---	---	---	---	---	3.0
37D---------- Rigley-Weikert-Berks	---	---	---	---	---	---	4.0
38B, 38C---------- Sequoia	75	15	40	55	2.5	4.5	5.0
39B---------- Unison	130	25	50	80	4.5	5.0	9.2
39C---------- Unison	125	23	45	65	4.0	4.7	9.2
39D---------- Unison	90	18	40	55	3.5	4.5	9.0
40C---------- Unison	110	20	40	55	3.5	3.7	8.0
41C---------- Weikert-Berks	---	---	26	35	2.4	2.2	4.5
41D---------- Weikert-Berks	---	---	20	30	2.0	2.0	4.0
41E---------- Weikert-Berks	---	---	---	---	---	---	3.0
42B---------- Zoar	90	18	40	50	3.5	3.0	6.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
1B, 1C---------- Berks	3f	Slight	Slight	Moderate	Slight	Northern red oak----	70	Eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	
						Virginia pine-------	70	
1D:								
Berks---------- (South aspect)	4f	Slight	Moderate	Moderate	Slight	Northern red oak----	60	Eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	60	
						Virginia pine-------	60	
Berks---------- (North aspect)	3f	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	
						Virginia pine-------	70	
2B---------- Blairton	3w	Slight	Moderate	Slight	Slight	Northern red oak----	70	Yellow-poplar, Japanese larch, eastern white pine, Norway spruce.
						White ash----------	70	
						Sugar maple---------	70	
						Yellow-poplar-------	80	
2C---------- Blairton	3w	Slight	Moderate	Slight	Slight	Northern red oak----	70	Yellow-poplar, Japanese larch, eastern white pine, Norway spruce.
						White ash----------	70	
						Sugar maple---------	70	
						Yellow-poplar-------	80	
3C---------- Buchanan	3o	Slight	Slight	Slight	Slight	Northern red oak----	75	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	80	
4C---------- Buchanan	3o	Slight	Slight	Slight	Slight	Northern red oak----	75	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	80	
5---------- Buckton	2w	Slight	Moderate	Slight	Slight	Yellow-poplar-------	95	Eastern white pine, black walnut, yellow-poplar.
						Northern red oak----	80	
						Eastern white pine--	90	
6C*:								
Carbo----------	3c	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
Endcav----------	2c	Slight	Moderate	Slight	Slight	Northern red oak----	85	Yellow-poplar, eastern white pine, black walnut.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
7C*:								
Carbo----------	3c	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
Endcav----------	2c	Slight	Moderate	Slight	Slight	Northern red oak----	85	Yellow-poplar, eastern white pine, black walnut.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
Rock outcrop.								
8C---------- Cataska	5f	Moderate	Slight	Severe	Severe	Chestnut oak--------	50	Shortleaf pine.
						Scarlet oak---------	50	
						Pitch pine----------	50	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
8D, 8E---------- Cataska	5f	Moderate	Moderate	Severe	Severe	Chestnut oak-------- Scarlet oak--------- Pitch pine----------	50 50 50	Shortleaf pine.
9---------- Chagrin	1o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Sugar maple--------- White oak---------- Black cherry-------- White ash---------- Black walnut--------	86 96 86 --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white ash, northern red oak, white oak.
10C---------- Chester	2o	Slight	Slight	Slight	Slight	Chestnut oak-------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	77 86 80 80	Black walnut, yellow-poplar, eastern white pine, western larch.
10D---------- Chester	2r	Moderate	Moderate	Slight	Slight	Chestnut oak-------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	77 86 80 80	Black walnut, yellow-poplar, eastern white pine, western larch.
10E---------- Chester	2r	Severe	Severe	Slight	Slight	Chestnut oak-------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	77 86 80 80	Black walnut, yellow-poplar, eastern white pine, western larch.
11D*:								
Chester----------	2r	Moderate	Moderate	Slight	Slight	Black oak---------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	77 86 80 80	Black walnut, yellow-poplar.
Manor----------	2r	Moderate	Moderate	Moderate	Slight	Black oak---------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	80 90 80 80	Yellow-poplar, eastern white pine.
11E*:								
Chester----------	2r	Severe	Severe	Slight	Slight	Black oak---------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	77 86 80 80	Black walnut, yellow-poplar.
Manor----------	2r	Severe	Severe	Moderate	Slight	Black oak---------- Yellow-poplar------- Virginia pine------- Shortleaf pine------	80 90 80 80	Yellow-poplar, eastern white pine.
12D---------- Chilhowie	4c	Moderate	Severe	Moderate	Slight	Northern red oak---- Virginia pine------- Shortleaf pine------	60 60 60	Virginia pine, eastern white pine.
13B, 13C---------- Clearbrook	3w	Moderate	Severe	Moderate	Moderate	Northern red oak---- Yellow-poplar-------	70 80	Eastern white pine, yellow-poplar.
14---------- Craigsville	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Virginia pine-------	80 95 90 80	Eastern white pine, yellow-poplar.
15E:								
Dekalb---------- (South aspect)	3r	Moderate	Severe	Slight	Slight	Northern red oak---- Black cherry-------- Yellow-poplar-------	66 75 76	Eastern white pine, red pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
15E:								
Dekalb (North aspect)	2r	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Yellow-poplar	76 80 93	Norway spruce, yellow-poplar, black cherry.
16F*:								
Drall (South aspect)	4f	Moderate	Severe	Severe	Slight	Northern red oak Virginia pine Eastern white pine	65 60 75	Virginia pine.
Drall (North aspect)	3f	Moderate	Severe	Moderate	Slight	Northern red oak Virginia pine Eastern white pine	75 70 85	Virginia pine.
Rubble land.								
17B, 17C Dyke	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine Shortleaf pine	85 95 80 80	Yellow-poplar, northern red oak, black walnut.
18B, 18C Endcav	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	85 90 90	Yellow-poplar, eastern white pine, black walnut.
19B Hawksbill	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	80 90 90	Eastern white pine, yellow-poplar, black walnut.
20B, 20C Hawksbill	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	80 90 90	Eastern white pine, yellow-poplar, black walnut.
21D Lew	2r	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	80 90 90	Virginia pine, yellow-poplar, eastern white pine.
22E Lew	2r	Moderate	Severe	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	80 90 90	Virginia pine, yellow-poplar, eastern white pine.
23B, 23C Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.
23D Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.
24B, 24C Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.
24D Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.
25C Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.
25D Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	76 86	Eastern white pine, yellow-poplar, white oak, black walnut.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
26C*:								
Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	86	
Rock outcrop.								
26E*:								
Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	86	
Rock outcrop.								
27B	2s	Slight	Slight	Moderate	Slight	White oak	80	Black walnut, eastern white pine.
Millrock						Northern red oak	80	
						Yellow-poplar	95	
						Eastern white pine	95	
28B	3o	Slight	Slight	Slight	Slight	Northern red oak	70	Eastern white pine.
Monongahela						Yellow-poplar	85	
						Eastern white pine	80	
						Virginia pine	66	
						White ash	---	
						Black walnut	---	
28C	3r	Moderate	Slight	Slight	Slight	Northern red oak	70	Eastern white pine.
Monongahela						Yellow-poplar	85	
						Eastern white pine	80	
						Virginia pine	66	
						White ash	---	
						Black walnut	---	
29C	2c	Slight	Moderate	Slight	Slight	Black oak	76	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
Montalto						Yellow-poplar	90	
						Virginia pine	75	
						Shortleaf pine	75	
						Eastern white pine	90	
30C	1o	Slight	Slight	Slight	Slight	Northern red oak	90	Yellow-poplar, black walnut, eastern white pine.
Myersville						Yellow-poplar	96	
30D	1r	Moderate	Moderate	Slight	Slight	Northern red oak	90	Yellow-poplar, black walnut, eastern white pine.
Myersville						Yellow-poplar	96	
31C*:								
Myersville	1o	Slight	Slight	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Catoctin	4f	Slight	Slight	Moderate	Slight	Virginia pine	60	Virginia pine, eastern white pine.
						Shortleaf pine	60	
						Northern red oak	60	
						Yellow-poplar	70	
31D*:								
Myersville	1r	Moderate	Moderate	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Catoctin	4f	Moderate	Moderate	Moderate	Slight	Virginia pine	60	Virginia pine, eastern white pine.
						Shortleaf pine	60	
						Northern red oak	60	
						Yellow-poplar	70	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
31E*:								
Myersville	1r	Severe	Severe	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Catoctin	4r	Severe	Severe	Moderate	Slight	Virginia pine	60	Virginia pine, eastern white pine, black walnut.
						Shortleaf pine	60	
						Northern red oak	60	
						Yellow-poplar	70	
32C*:								
Myersville	1o	Slight	Slight	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Montalto	2c	Slight	Moderate	Slight	Slight	Black oak	76	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	
						Virginia pine	75	
						Shortleaf pine	75	
						Eastern white pine	90	
32D*:								
Myersville	1r	Moderate	Moderate	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Montalto	2c	Moderate	Moderate	Slight	Slight	Black oak	76	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	
						Virginia pine	76	
						Shortleaf pine	76	
						Eastern white pine	90	
32E*:								
Myersville	1r	Severe	Severe	Slight	Slight	Northern red oak	86	Yellow-poplar, black walnut, eastern white pine.
						Yellow-poplar	96	
Montalto	2r	Severe	Severe	Slight	Slight	Black oak	76	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	
						Virginia pine	75	
						Shortleaf pine	75	
						Eastern white pine	90	
33 Newark	1w	Slight	Moderate	Slight	Moderate	Pin oak	99	Eastern cottonwood, sweetgum, red maple, American sycamore, eastern white pine, yellow-poplar.
						Eastern cottonwood	96	
						Northern red oak	86	
						Yellow-poplar	96	
						Sweetgum	96	
35 Purdy	1w	Slight	Severe	Severe	Severe	Pin oak	86	Eastern white pine.
						Shortleaf pine	86	
						Virginia pine	86	
						Yellow-poplar	96	
						Sweetgum	96	
36E:								
Rigley (South aspect)	3r	Severe	Severe	Slight	Slight	Northern red oak	70	Shortleaf pine, eastern white pine.
Rigley (North aspect)	2r	Severe	Severe	Slight	Slight	Northern red oak	80	Yellow-poplar, shortleaf pine.
						Yellow-poplar	90	
37D*:								
Rigley (South aspect)	3r	Moderate	Moderate	Slight	Slight	Northern red oak	80	Yellow-poplar, shortleaf pine.
						Yellow-poplar	90	
Weikert (South aspect)	5d	Slight	Moderate	Severe	Moderate	Northern red oak	55	Virginia pine, shortleaf pine.
						Virginia pine	52	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
37D*:								
Berks (South aspect)	4f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Eastern white pine, Japanese larch, Norway spruce.
Rigley (North aspect)	2r	Moderate	Moderate	Moderate	Slight	Northern red oak	70	Shortleaf pine.
Weikert (North aspect)	4d	Slight	Moderate	Severe	Moderate	Northern red oak Virginia pine	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Berks (North aspect)	3f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Eastern white pine, Japanese larch, Norway spruce.
38B, 38C Sequoia	3o	Slight	Slight	Slight	Slight	Northern red oak Shortleaf pine Virginia pine	70 66 71	Shortleaf pine, eastern white pine.
39B, 39C Unison	1o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Virginia pine	86 96 86	Yellow-poplar, black walnut, eastern white pine.
39D Unison	1r	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine	86 96 86	Yellow-poplar, black walnut, eastern white pine.
40C Unison	1o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Virginia pine	86 96 86	Yellow-poplar, black walnut, eastern white pine.
41C*:								
Weikert	4d	Slight	Slight	Severe	Moderate	Northern red oak Virginia pine	59 56	Virginia pine, shortleaf pine, red pine, eastern white pine.
Berks	3f	Slight	Slight	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Eastern white pine, Japanese larch, Norway spruce.
41D*:								
Weikert (South aspect)	5d	Slight	Moderate	Severe	Moderate	Northern red oak Virginia pine	55 52	Virginia pine, shortleaf pine.
Berks (South aspect)	4f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Eastern white pine, Japanese larch, Norway spruce.
Weikert (North aspect)	4d	Slight	Moderate	Severe	Moderate	Northern red oak Virginia pine	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Berks (North aspect)	3f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Eastern white pine, Japanese larch, Norway spruce, red pine.
41E*:								
Weikert (South aspect)	5d	Moderate	Severe	Severe	Moderate	Northern red oak Virginia pine	55 52	Shortleaf pine.
Berks (South aspect)	4f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Eastern white pine, Japanese larch, Norway spruce, red pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
41E*:								
Weikert (North aspect)	4d	Moderate	Severe	Severe	Moderate	Northern red oak Virginia pine	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Berks (North aspect)	3f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Eastern white pine, Japanese larch, Norway spruce, red pine.
42B Zoar	3w	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine Eastern white pine Black oak White oak Red maple	70 80 70 80 70 70 ---	Eastern white pine, shortleaf pine, yellow-poplar.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1B Berks	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: small stones.
1C Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
1D Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
2B Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2C Blairton	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
3C Buchanan	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
4C Buchanan	Severe: wetness.	Severe: wetness.	Severe: large stones, slope, small stones.	Severe: wetness.	Severe: small stones, wetness.
5 Buckton	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
6C*: Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
7C*: Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Rock outcrop.					
8C Cataska	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
8D Cataska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
8E Cataska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
9 Chagrin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
10C---------- Chester	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: large stones, slope.
10D---------- Chester	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
10E---------- Chester	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11D*: Chester----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Manor----------	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.	Moderate: slope.	Severe: slope.
11E*: Chester----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Manor----------	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.	Severe: slope.	Severe: slope.
12D---------- Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
13B---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: large stones, wetness.	Severe: wetness.	Severe: large stones, wetness.
13C---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: large stones, slope, wetness.	Severe: wetness, erodes easily.	Severe: large stones, wetness.
14---------- Craigsville	Severe: flooding.	Moderate: flooding, large stones.	Severe: flooding.	Moderate: large stones, flooding.	Severe: flooding.
15E---------- Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
16F*: Drall----------	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, droughty, slope.
Rubble land.					
17B---------- Dyke	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
17C---------- Dyke	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
18B---------- Endcav	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
18C---------- Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
19B---------- Hawksbill	Severe: flooding.	Moderate: flooding, small stones.	Severe: large stones, flooding.	Severe: large stones.	Moderate: small stones, droughty, flooding.
20B---------- Hawksbill	Severe: flooding, large stones.	Severe: large stones.	Severe: large stones, flooding.	Severe: large stones.	Severe: large stones.
20C---------- Hawksbill	Severe: flooding, large stones.	Severe: large stones.	Slope, large stones, flooding.	Severe: large stones.	Severe: large stones.
21D---------- Lew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
22E---------- Lew	Severe: slope, large stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: small stones, large stones, slope.
23B---------- Lodi	Slight----------	Slight----------	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
23C---------- Lodi	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
23D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
24B---------- Lodi	Slight----------	Slight----------	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
24C---------- Lodi	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
24D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
25C---------- Lodi	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
25D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
26C*: Lodi----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Rock outcrop.					
26E*: Lodi----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
27B---------- Millrock	Severe: flooding.	Moderate: flooding, too sandy.	Moderate: flooding, too sandy.	Moderate: too sandy.	Severe: flooding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
28B---------- Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Severe: erodes easily.	Slight.
28C---------- Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
29C---------- Montalto	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
30C---------- Myersville	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
30D---------- Myersville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
31C*:					
Myersville----------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight----------	Moderate: large stones, slope.
Catoctin----------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight----------	Moderate: large stones, droughty, slope.
31D*:					
Myersville----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Catoctin----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
31E*:					
Myersville----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Catoctin----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
32C*:					
Myersville----------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight----------	Moderate: large stones, slope.
Montalto----------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
32D*:					
Myersville----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Montalto----------	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
32E*:					
Myersville	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Montalto	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
33 Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
34*. Pits					
35 Purdy	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.
36E Rigley	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
37D*:					
Rigley	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
38B Sequoia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: thin layer.
38C Sequoia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
39B Unison	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
39C Unison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
39D Unison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
40C Unison	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.	Moderate: large stones, slope.
41C*:					
Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Slight	Severe: thin layer, small stones.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
41C*:					
Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
41D*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
41E*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
42B	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
Zoar					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1B---Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
1C---Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
1D---Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
2B---Blairton	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
2C---Blairton	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
3C---Buchanan	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
4C---Buchanan	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
5---Buckton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6C*:										
Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7C*:										
Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
8C, 8D, 8E---Cataska	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
9---Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10C---Chester	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10D---Chester	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
10E---Chester	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
11D*, 11E*:										
Chester	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Manor	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
12D---- Chilhowie	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
13B---- Clearbrook	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Poor.
13C---- Clearbrook	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
14---- Craigsville	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
15E---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
16F*: Drall----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Rubble land.										
17B---- Dyke	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
17C---- Dyke	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
18B---- Endcav	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18C---- Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
19B---- Hawksbill	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20B, 20C---- Hawksbill	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
21D---- Lew	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
22E---- Lew	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
23B---- Lodi	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
23C---- Lodi	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23D---- Lodi	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
24B---- Lodi	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24C---- Lodi	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24D---- Lodi	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
25C---- Lodi	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
25D---------- Lodi	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
26C*: Lodi----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
26E*: Lodi----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
27B---------- Millrock	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
28B---------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28C---------- Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
29C---------- Montalto	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
30C---------- Myersville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
30D---------- Myersville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
31C*, 31D*: Myersville---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Catoctin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
31E*: Myersville---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Catoctin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
32C*, 32D*: Myersville---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Montalto----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
32E*: Myersville---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Montalto----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
33---------- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
34*. Pits										

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
35---- Purdy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
36E---- Rigley	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
37D*:										
Rigley----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Weikert----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
38B, 38C---- Sequoia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
39B---- Unison	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39C---- Unison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
39D---- Unison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
40C---- Unison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
41C*:										
Weikert----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
41D*:										
Weikert----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
41E*:										
Weikert----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
42B---- Zoar	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1B---------- Berks	Moderate: depth to rock.	Slight----------	Moderate: depth to rock.	Moderate: slope.	Slight----------	Severe: small stones.
1C---------- Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
1D---------- Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
2B---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
2C---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.	Severe: wetness.
3C---------- Buchanan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: wetness.
4C---------- Buchanan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: small stones, wetness.
5---------- Buckton	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
6C*:						
Carbo----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
Endcav----------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
7C*:						
Carbo----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
Endcav----------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Rock outcrop.						
8C---------- Cataska	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: small stones.
8D, 8E---------- Cataska	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
9---------- Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
10C---------- Chester	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10D, 10E---------- Chester	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11D*, 11E*: Chester----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Manor----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12D---------- Chilhowie	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
13B---------- Clearbrook	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: low strength, wetness.	Severe: large stones, wetness.
13C---------- Clearbrook	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, slope, large stones.	Severe: low strength, wetness.	Severe: large stones, wetness.
14---------- Craigsville	Severe: cutbanks cave, large stones.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
15E---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
16F*: Drall----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, droughty, slope.
Rubble land.						
17B---------- Dyke	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
17C---------- Dyke	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
18B---------- Endcav	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
18C---------- Endcav	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
19B---------- Hawksbill	Severe: large stones.	Severe: flooding.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Moderate: small stones, droughty, flooding.
20B---------- Hawksbill	Severe: large stones.	Severe: flooding.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.
20C---------- Hawksbill	Severe: large stones.	Severe: flooding.	Severe: flooding, large stones.	Severe: flooding, slope, large stones.	Severe: flooding, large stones.	Severe: large stones.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
21D---------- Lew	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
22E---------- Lew	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones, slope.
23B---------- Lodi	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
23C---------- Lodi	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
23D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
24B---------- Lodi	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
24C---------- Lodi	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
24D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
25C---------- Lodi	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
25D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
26C*: Lodi----------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Rock outcrop.						
26E*: Lodi----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
27B---------- Millrock	Severe: flooding, cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
28B---------- Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
28C---------- Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
29C---------- Montalto	Moderate: too clayey, dense layer, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, slope.
30C---------- Myersville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
30D---------- Myersville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31C*:						
Myersville-------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
Catoctin---------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Moderate: large stones, droughty, slope.
31D*, 31E*:						
Myersville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Catoctin---------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
32C*:						
Myersville-------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
Montalto---------	Moderate: too clayey, dense layer, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones, slope.
32D*, 32E*:						
Myersville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Montalto---------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
33---------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
34*. Pits						
35---------- Purdy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
36E---------- Rigley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
37D*:						
Rigley----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
37D*:						
Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
38B	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Sequoia						
38C	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Sequoia						
39B	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Moderate: large stones.
Unison						
39C	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
Unison						
39D	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Unison						
40C	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
Unison						
41C*:						
Weikert	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: thin layer, small stones.
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
41D*, 41E*:						
Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
42B	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
Zoar						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1B Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
1C Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
1D Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
2B Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
2C Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
3C, 4C Buchanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
5 Buckton	Severe: flooding.	Severe: seepage, flooding.	Severe: seepage, flooding.	Severe: flooding.	Fair: too clayey, thin layer.
6C*: Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Endcav	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
7C*: Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Endcav	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Rock outcrop.					
8C Cataska	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
8D, 8E Cataska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9---------- Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
10C---------- Chester	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
10D, 10E---------- Chester	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
11D*, 11E*: Chester----------	Severe: slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Poor: slope.
Manor----------	Severe: slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
12D---------- Chilhowie	Severe: slope, depth to rock, percs slowly.	Severe: slope, delth to rock.	Severe: slope, depth to rock, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
13B---------- Clearbrook	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, large stones.
13C---------- Clearbrook	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, large stones.
14---------- Craigsville	Severe: flooding, poor filter.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: large stones, seepage.
15E---------- Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
16F*: Drall----------	Severe: slope, poor filter.	Severe: slope, seepage.	Severe: seepage, depth to rock, slope.	Severe: slope, seepage.	Poor: slope, small stones, seepage.
Rubble land.					
17B---------- Dyke	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight----------	Poor: too clayey.
17C---------- Dyke	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
18B---------- Endcav	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
18C---------- Endcav	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
19B---------- Hawksbill	Severe: flooding.	Severe: flooding.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage.	Poor: large stones.
20B---------- Hawksbill	Severe: large stones, flooding.	Severe: flooding, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage.	Poor: large stones.
20C---------- Hawksbill	Severe: large stones, flooding.	Severe: flooding, large stones, slope.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage.	Poor: large stones.
21D, 22E---------- Lew	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: hard to pack, large stones, slope.
23B---------- Lodi	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
23C---------- Lodi	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
23D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
24B---------- Lodi	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
24C---------- Lodi	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
24D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
25C---------- Lodi	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
25D---------- Lodi	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
26C*: Lodi----------	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Rock outcrop.					
26E*: Lodi----------	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
27B---------- Millrock	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Severe: flooding, seepage.	Fair: too sandy.
28B---------- Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
28C---------- Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
29C---------- Montalto	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
30C---------- Myersville	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: small stones, slope.
30D---------- Myersville	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
31C*: Myersville---------	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: small stones, slope.
Catoctin----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
31D*, 31E*: Myersville---------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Catoctin----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
32C*: Myersville---------	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: small stones, slope.
Montalto----------	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
32D*, 32E*: Myersville---------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Montalto----------	Severe: percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33--Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
34*. Pits					
35--Purdy	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
36E--Rigley	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
37D*: Rigley	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
38B--Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: area reclaim, too clayey, hard to pack.
38C--Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: area reclaim, too clayey, hard to pack.
39B--Unison	Moderate: percs slowly.	Severe: seepage.	Severe: too clayey, seepage.	Slight	Poor: too clayey, hard to pack.
39C--Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: too clayey, seepage.	Moderate: slope.	Poor: too clayey, hard to pack.
39D--Unison	Severe: slope.	Severe: seepage, slope.	Severe: slope, too clayey, seepage.	Severe: slope.	Poor: slope, too clayey, hard to pack.
40C--Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: too clayey, seepage.	Moderate: slope.	Poor: too clayey, hard to pack.
41C*: Weikert	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
41D*, 41E*:					
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
42B	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Zoar					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1B, 1C Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
1D Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
2B, 2C Blairton	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
3C, 4C Buchanan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
5 Buckton	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
6C*: Carbo	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, large stones.
Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
7C*: Carbo	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, large stones.
Endcav Rock outcrop.	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
8C Cataska	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
8D Cataska	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
8E Cataska	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
9 Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
10C Chester	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
10D Chester	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
10E---------- Chester	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
11D*: Chester----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Manor----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
11E*: Chester----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Manor----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
12D---------- Chilhowie	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
13B, 13C---------- Clearbrook	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, wetness.
14---------- Craigsville	Fair: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
15E---------- Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
16F*: Drall----------	Poor: slope.	Improbable: small stones.	Probable----------	Poor: area reclaim, slope, large stones.
Rubble land.				
17B---------- Dyke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, small stones.
17C---------- Dyke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
18B, 18C---------- Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
19B---------- Hawksbill	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines.	Poor: area reclaim, small stones.
20B, 20C---------- Hawksbill	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines.	Poor: large stones, area reclaim.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
21D Lew	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
22E Lew	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
23B, 23C Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
23D Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
24B, 24C Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
24D Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
25C Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
25D Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
26C*: Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
26E*: Lodi	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
27B Millrock	Good	Probable	Probable	Poor: too sandy.
28B Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
28C Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
29C Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
30C Myersville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
30D Myersville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
31C*:				
Myersville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, small stones, slope.
Catoctin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
31D*:				
Myersville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Catoctin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
31E*:				
Myersville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Catoctin	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
32C*:				
Myersville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, small stones, slope.
Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
32D*:				
Myersville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
32E*:				
Myersville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
33 Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
34*. Pits				
35 Purdy	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
36E Rigley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37D*:				
Rigley	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
38B, 38C Sequoia	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
39B, 39C Unison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
39D Unison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
40C Unison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer.
41C*:				
Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
41D*:				
Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclim.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
41E*:				
Weikert	Poor: slope, area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
42B Zoar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1B---------- Berks	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, large stones.	Droughty, depth to rock, large stones.
1C, 1D---------- Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
2B---------- Blairton	Moderate: seepage, depth to rock, slope.	Severe: piping, wetness.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Depth to rock, wetness.	Wetness, droughty.
2C---------- Blairton	Severe: slope.	Severe: piping, wetness.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, droughty.
3C, 4C---------- Buchanan	Severe: slope.	Severe: piping, wetness.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, large stones, wetness.	Large stones, wetness, slope.
5---------- Buckton	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
6C*: Carbo----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Endcav----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope----------	Slope, erodes easily, percs slowly.
7C*: Carbo----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Endcav----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope----------	Slope, erodes easily, percs slowly.
Rock outcrop.						
8C, 8D, 8E-------- Cataska	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
9---------- Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Flooding-------	Not needed-----	Favorable.
10C, 10D, 10E----- Chester	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
11D*, 11E*: Chester----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Manor----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
12D---------- Chilhowie	Severe: slope.	Severe: seepage, hard to pack.	Deep to water	Droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
13B---------- Clearbrook	Moderate: depth to rock.	Severe: thin layer, large stones, wetness.	Depth to rock, large stones, slope.	Large stones, wetness, depth to rock.	Large stones, depth to rock.	Large stones, wetness.
13C---------- Clearbrook	Severe: slope.	Severe: thin layer, large stones, wetness.	Depth to rock, large stones, slope.	Large stones, wetness, depth to rock.	Slope, large stones, depth to rock.	Large stones, wetness, slope.
14---------- Craigsville	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
15E---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
16F*: Drall----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, slope, fast intake.	Large stones, too sandy, slope.	Droughty, large stones, slope.
Rubble land.						
17B---------- Dyke	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
17C---------- Dyke	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
18B---------- Endcav	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily	Erodes easily, percs slowly.
18C---------- Endcav	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
19B, 20B---------- Hawksbill	Severe: seepage.	Severe: large stones.	Deep to water, flooding, large stones.	Large stones, flooding, slope.	Large stones---	Large stones.
20C---------- Hawksbill	Severe: seepage, slope.	Severe: large stones.	Deep to water, flooding, large stones.	Large stones, flooding, slope.	Large stones, slope.	Large stones, slope.
21D, 22E---------- Lew	Severe: slope.	Severe: piping, hard to pack, large stones.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
23B---------- Lodi	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
23C, 23D---------- Lodi	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
24B---------- Lodi	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
24C, 24D, 25C, 25D---------- Lodi	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
26C*, 26E*:						
Lodi	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.						
27B---------- Millrock	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, seepage, fast intake.	Not needed-----	Not needed.
28B---------- Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
28C---------- Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
29C---------- Montalto	Severe: slope.	Severe: hard to pack.	Deep to water	Rooting depth, slope.	Slope----------	Slope, rooting depth.
30C, 30D---------- Myersville	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Slope----------	Slope.
31C*, 31D*, 31E*:						
Myersville-------	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
Catoctin---------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
32C*, 32D*, 32E*:						
Myersville-------	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
Montalto---------	Severe: slope.	Severe: hard to pack.	Deep to water	Rooting depth, slope.	Slope----------	Slope, rooting depth.
33---------- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
34*. Pits						
35---------- Purdy	Slight---------	Severe: piping, hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
36E---------- Rigley	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
37D*:						
Rigley----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
Weikert----------	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty.
Berks----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
38B---------- Sequoia	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
38C---------- Sequoia	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
39B---------- Unison	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
39C, 39D---------- Unison	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
40C---------- Unison	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Large stones, slope.	Large stones, slope.
41C*, 41D*, 41E*: Weikert----------	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty.
Berks----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
42B---------- Zoar	Moderate: slope.	Severe: hard to pack, thin layer.	Slope, percs slowly.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1B, 1C, 1D-------- Berks	0-5	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	5-21	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	21-32	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
2B, 2C----------- Blairton	0-5	Silt loam---------	ML, CL-ML	A-4	0	80-100	75-100	65-90	50-80	20-35	2-10
	5-21	Silt loam, channery silty clay loam, very shaly loam.	ML, CL, GM	A-4, A-6, A-7, A-2	0-5	50-90	35-90	30-85	25-70	25-42	2-20
	21-36	Very shaly loam, channery loam, very shaly silt loam.	GM, SM, ML, CL	A-4, A-2, A-6, A-1	0-10	15-65	15-65	15-65	10-60	25-40	2-12
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3C--------------- Buchanan	0-7	Fine sandy loam--	ML, CL, CL-ML	A-4	0-5	90-100	85-100	75-90	50-85	20-35	2-11
	7-20	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-4, A-2	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-60	Gravelly loam, silt loam, channery clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
4C--------------- Buchanan	0-7	Very stony fine sandy loam.	GM, ML, CL, CL-ML	A-2, A-4	3-20	50-90	45-75	40-75	30-65	20-35	2-11
	7-20	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-60	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
5---------------- Buckton	0-7	Silt loam---------	CL, ML, SM-SC, CL-ML	A-4, A-6	0-2	99-100	98-100	80-100	50-90	<30	NP-15
	7-48	Silt loam, silty clay loam, clay loam.	CL, SC	A-4, A-6, A-7	0-2	99-100	98-100	90-95	70-90	20-45	7-25
	48-73	Stratified fine sand to gravelly sandy loam.	SM, SM-SC, CL-ML	A-1, A-2, A-4	0-25	75-90	70-90	45-65	15-40	<20	NP-7
6C*:											
Carbo------------	0-7	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-15
	7-32	Clay--------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav-----------	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	7-50	Clay--------------	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7C*:											
Carbo	0-7	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-15
	7-32	Clay	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	7-50	Clay	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
8C, 8D	0-4	Slaty silt loam	CL-ML, ML, GM, GM-GC	A-4	5-15	55-80	50-75	45-70	40-60	<30	NP-6
Cataska	4-17	Slaty silt loam, channery silt loam, very channery loam.	GM-GC, GM, GP-GM	A-2, A-1	10-25	15-50	10-45	10-40	10-35	<30	NP-7
	17-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
8E	0-3	Slaty silt loam	CL-ML, ML, GM, GM-GC	A-4	5-15	55-80	50-75	45-70	40-60	<30	NP-6
Cataska	3-10	Slaty silt loam, channery silt loam, very channery loam.	GM-GC, GM, GP-GM	A-2, A-1	10-25	15-50	10-45	10-40	10-35	<30	NP-7
	10-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9	0-10	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	55-85	35-55	<25	NP-5
Chagrin	10-37	Silt loam, loam, fine sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	37-60	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
10C, 10D	0-6	Loam	ML, CL	A-4, A-6, A-7	0-10	90-100	90-100	75-90	55-75	33-47	8-12
Chester	6-40	Silty clay loam, silt loam, channery loam.	ML, CL, SM, SC	A-4, A-6, A-7	0-10	85-100	55-100	50-95	40-70	30-50	8-17
	40-60	Loam	SM, SC, ML	A-2, A-4, A-7	0-10	80-100	70-100	70-95	30-65	<47	<16
10E	0-4	Loam	ML, CL	A-4, A-6, A-7	0-10	90-100	90-100	75-90	55-75	33-47	8-12
Chester	4-34	Silty clay loam, silt loam, channery loam.	ML, CL, SM, SC	A-4, A-6, A-7	0-10	85-100	55-100	50-95	40-70	30-50	8-17
	34-60	Loam	SM, SC, ML	A-2, A-4, A-7	0-10	80-100	70-100	70-95	30-65	<47	NP-16
11D*, 11E*:											
Chester	0-5	Very stony loam	ML, CL	A-4, A-6, A-7	3-10	80-100	75-90	65-90	55-75	33-47	8-12
	5-32	Silty clay loam, silt loam, loam.	ML, CL, SM, SC	A-4, A-6, A-7	0-5	85-100	80-100	70-100	50-90	30-50	8-17
	32-60	Loam, sandy loam	SM, SC, ML	A-2, A-4, A-7	0-5	85-100	80-100	50-95	25-65	<45	NP-16

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
11D*, 11E*:											
Manor	0-12	Very stony sandy loam.	ML, SM, GM	A-4, A-6	3-15	70-100	60-100	50-95	35-90	32-40	6-12
	12-31	Loam, silt loam, channery loam.	SM, ML, GM	A-4, A-6	0-10	70-95	60-90	50-95	35-85	26-40	4-12
	31-60	Loam, sandy loam, channery sandy loam.	SM, ML, CL-ML, SM-SC	A-1, A-2, A-4, A-6	0-5	70-100	60-100	35-95	20-75	20-40	2-12
12D	0-3	Silty clay loam	MH, ML, CL, CH	A-7	0-10	90-100	85-100	80-100	70-95	40-65	15-30
Chilhowie	3-19	Clay, silty clay	CH, MH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	20-35
	19-23	Very channery clay, very channery silty clay, flaggy clay.	CH, GC, MH, GM	A-7, A-2	10-30	25-80	15-65	15-65	15-60	50-65	20-35
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13B, 13C	0-6	Shaly silt loam	CL-ML	A-4	15-50	75-90	60-85	55-75	50-70	10-15	NP-10
Clearbrook	6-26	Shaly silt loam, very shaly silt loam, very shaly silty clay loam.	ML, CL	A-4, A-6	20-70	75-90	60-85	55-75	50-70	25-40	10-20
	26-38	Very shaly silty clay loam, very shaly silty clay.	CL, GC	A-4, A-6, A-7	50-70	60-85	50-75	50-65	45-60	35-45	15-25
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
14	0-3	Cobbly sandy loam	ML, SM, CL-ML, SC	A-2, A-4	25-50	80-95	75-95	50-80	25-60	<25	NP-10
Craigsville	3-40	Gravelly sandy loam, cobbly loam, very gravelly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	40-60	Very gravelly loamy sand, very gravelly sandy loam, very cobbly sandy loam.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-75	35-55	30-50	20-45	10-25	<25	NP-8
15E	0-5	Channery loam	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	15-32	NP-9
Dekalb	5-24	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	24-39	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
16F*:											
Drall	0-4	Very stony loamy sand.	SP, SM, GW, GM	A-1, A-2-4	35-60	30-55	25-45	15-35	4-20	---	NP
	4-22	Very channery sand, very channery loamy sand.	SP, SM, GW, GM	A-1, A-2-4	10-35	25-40	20-35	15-30	4-20	---	NP
	22-42	Sandy loam, sandy clay loam, sandy clay.	SM, SC	A-2, A-4, A-6	5-15	80-95	75-85	45-65	20-45	20-30	3-20
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land.											
17B, 17C	0-9	Loam	ML, CL	A-6, A-7	0-5	90-100	75-100	70-100	60-90	35-45	10-20
Dyke	9-44	Clay, silty clay, silty clay loam.	MH, CH, ML, CL	A-7, A-6	0-15	85-100	75-100	65-90	55-80	35-60	10-30
	44-66	Cobbly clay loam, very cobbly clay loam.	MH, SM, GM	A-7	35-70	65-85	55-75	45-70	40-60	70-80	30-40
18B, 18C	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	65-90	20-35	5-15
Endcav	7-50	Clay	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
19B	0-6	Cobbly loam	SM, GM, SW-SM, GW-GM	A-1, A-2, A-4	20-70	40-75	20-70	15-65	10-50	<25	5-15
Hawksbill	6-25	Cobbly loam, very cobbly clay loam, gravelly clay loam.	GC, CL	A-2, A-6	20-70	40-75	35-70	25-60	20-55	25-40	10-20
	25-47	Very gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2, A-6	50-75	30-65	20-60	20-60	15-45	25-40	10-20
	47-60	Very gravelly loam, very cobbly loam.	GM, GC	A-1, A-2, A-4, A-6	50-75	30-65	20-60	20-60	15-45	<30	NP-15
20B, 20C	0-6	Very cobbly loam	SM, GM, SW-SM, GW-GM	A-1, A-2, A-4	20-70	40-75	20-70	15-65	10-50	<25	5-15
Hawksbill	6-25	Cobbly loam, very cobbly clay loam, gravelly clay loam.	GC, CL	A-2, A-6	20-70	40-75	35-70	25-60	20-55	25-40	10-20
	25-47	Very gravelly clay loam, very cobbly loam, very cobbly clay loam.	GC	A-2, A-6	50-75	30-65	20-60	20-60	15-45	25-40	10-20
	47-60	Very gravelly loam, very cobbly loam.	GM, GC	A-1, A-2, A-4, A-6	50-75	30-65	20-60	20-60	15-45	<30	NP-15
21D	0-12	Channery loam	ML, GM, CL, SC	A-4	15-45	60-90	55-75	50-70	36-60	<28	NP-8
Lew	12-60	Channery silty clay loam, very channery silty clay loam, channery clay loam.	ML, MH, GM, SM	A-2, A-4, A-6, A-7	15-70	40-90	30-75	28-75	25-70	32-56	8-20

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22E---------- Lew	0-12	Very stony loam	ML, GM, CL, GC	A-2, A-4	5-70	35-85	30-75	28-70	25-60	<28	NP-8
	12-60	Channery silty clay loam, very channery silty clay loam, channery clay loam.	ML, MH, GM, SM	A-2, A-4, A-6, A-7	15-70	40-90	30-75	28-75	25-70	32-56	8-20
23B, 23C, 23D, 24B, 24C, 24D, 25C, 25D-------- Lodi	0-6	Silt loam--------	ML, CL, SM, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-85	<30	NP-15
	6-41	Clay, silty clay loam, sandy clay loam.	CH, MH, CL, SC	A-7, A-6	0-5	85-100	75-95	60-95	40-80	40-60	20-35
	41-63	Clay, sandy clay loam, loam.	ML, SM, CL	A-4, A-6	0-5	85-100	75-95	60-85	40-80	<40	NP-25
26C*: Lodi----------	0-6	Silt loam--------	ML, CL, SM, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-85	<30	NP-15
	6-41	Clay, silty clay loam, sandy clay loam.	CH, MH, CL, SC	A-7, A-6	0-5	85-100	75-95	60-95	40-80	40-60	20-35
	41-63	Clay, sandy clay loam, loam.	ML, SM, CL	A-4, A-6	0-5	85-100	75-95	60-85	40-80	<40	NP-25
Rock outcrop.											
26E*: Lodi----------	0-5	Silt loam--------	ML, CL, SM, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-85	<30	NP-15
	5-41	Clay, silty clay loam, sandy clay loam.	CH, MH, CL, SC	A-7, A-6	0-5	85-100	75-95	60-95	40-80	40-60	20-35
	41-63	Clay, sandy clay loam, loam.	ML, SM, CL	A-4, A-6	0-5	85-100	75-95	60-85	40-80	<40	NP-25
Rock outcrop.											
27B---------- Millrock	0-12	Loamy fine sand	SM	A-2, A-4, A-1	0	95-100	85-100	45-85	15-40	<20	NP-4
	12-43	Loamy sand, loamy fine sand, gravelly loamy sand.	SP-SM, SM	A-1, A-2, A-4	0	85-100	70-100	40-85	10-40	<20	NP-4
	43-60	Loamy sand, sand, gravelly loamy sand.	SP, SM	A-1, A-2	0-20	50-100	35-100	15-75	3-25	<20	NP-4
28B, 28C---------- Monongahela	0-11	Loam----------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	11-24	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	24-53	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	53-60	Clay loam--------	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
29C---------- Montalto	0-6	Loam----------	ML, CL, CH	A-4, A-6, A-7	0-5	75-100	70-100	60-100	40-95	36-52	10-25
	6-53	Clay, silty clay, clay loam.	CL, CH, MH	A-6, A-7	0-5	75-100	70-100	60-100	50-95	40-54	18-27
	53-60	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	75-100	70-100	60-100	40-95	38-52	13-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30C, 30D--------- Myersville	0-6	Silt loam---------	ML, CL, CL-ML	A-4	0-3	95-100	95-100	80-95	55-85	18-28	2-10
	6-16	Silty clay loam, clay loam, channery clay loam.	CL	A-6	0-3	70-95	60-95	55-90	50-85	28-38	12-20
	16-52	Silt loam, channery silt loam, very channery clay loam.	CL, CL-ML, GM	A-3, A-4	0-3	25-90	20-85	12-75	10-60	<28	NP-10
	52-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
31C*, 31D*, 31E*: Myersville------	0-6	Very stony silt loam.	ML, CL, CL-ML	A-4	5-25	95-100	90-100	80-95	55-85	18-28	2-10
	6-16	Silty clay loam, clay loam, channery clay loam.	CL	A-6	3-20	75-95	70-95	55-90	50-85	28-38	12-20
	16-52	Silty clay loam, channery silt loam, very channery clay loam.	CL, CL-ML, GM	A-3, A-4	3-20	30-85	20-75	12-70	10-65	<28	NP-10
	52-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Catoctin---------	0-5	Very stony silt loam.	ML, CL, CL-ML	A-4	5-20	80-90	75-85	70-80	60-70	<30	NP-8
	5-13	Channery silt loam, channery silty clay loam, cobbly silty clay loam.	SM, SC, CL, GM	A-2, A-4, A-6	0-25	50-80	35-75	30-60	25-60	20-34	2-12
	13-24	Very channery silt loam, channery silt loam.	SM, SC, GC, GM	A-2, A-4, A-1, A-3	10-40	30-75	10-60	9-55	7-50	<28	NP-8
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
32C*, 32D*, 32E*: Myersville------	0-6	Very stony silt loam.	ML, CL, CL-ML	A-4	5-25	95-100	90-100	80-95	55-85	18-28	2-10
	6-16	Silty clay loam, clay loam, channery clay loam.	CL	A-6	3-20	75-95	70-95	55-90	50-85	28-38	12-20
	16-52	Silty clay loam, channery silt loam, very channery clay loam.	CL, CL-ML, GM	A-3, A-4	3-20	30-85	20-75	12-70	10-65	<28	NP-10
	52-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Montalto---------	0-6	Very stony loam	ML, CL, CH	A-4, A-6, A-7	5-10	75-100	70-100	60-100	40-95	36-52	10-25
	6-53	Clay, silty clay, clay loam.	CL, CH, MH	A-6, A-7	0-5	75-100	70-100	65-100	50-95	40-54	18-27
	53-60	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	75-100	70-100	60-100	40-95	38-52	13-25
33--------------- Newark	0-10	Silt loam---------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	10-44	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	3-20
	44-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
34*. Pits											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
35---------- Purdy	0-6	Loam----------	ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	90-100	25-50	4-20
	6-32	Silty clay, clay, clay loam.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	75-85	30-65	11-30
	32-60	Silty clay, clay loam, clay.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	70-95	30-65	11-30
36E---------- Rigley	0-6	Very stony sandy loam.	SM, ML	A-2, A-4	5-25	80-95	75-90	55-80	25-65	<30	NP-7
	6-41	Gravelly sandy loam, gravelly loam, sandy loam.	SM, ML, GM	A-1, A-2, A-4	5-15	65-95	60-90	40-75	20-60	<30	NP-7
	41-60	Gravelly sandy loam, gravelly loam, gravelly clay loam.	GM, GC, SM, SC	A-1, A-2, A-4, A-6	10-25	55-80	45-70	30-60	15-50	<35	NP-15
37D*:											
Rigley----------	0-6	Very stony sandy loam.	SM, ML	A-2, A-4	5-25	80-95	75-90	55-80	25-65	<30	NP-7
	6-41	Gravelly sandy loam, gravelly loam, sandy loam.	SM, ML, GM	A-1, A-2, A-4	5-15	65-95	60-90	40-75	20-60	<30	NP-7
	41-60	Gravelly sandy loam, gravelly loam, gravelly clay loam.	GM, GC, SM, SC	A-1, A-2, A-4, A-6	10-25	55-80	45-70	30-60	15-50	<35	NP-15
Weikert---------	0-3	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-15	Weathered bedrock	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks----------	0-5	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	5-21	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	21-32	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
38B, 38C--------- Sequoia	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	10-38	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	38-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
39B, 39C, 39D---- Unison	0-7	Loam----------	CL, ML, CL-ML, SM	A-4, A-6	0-25	75-100	75-100	60-95	50-90	20-38	2-15
	7-39	Clay loam, clay, gravelly silty clay.	CL, CH	A-6, A-7	0-25	75-100	65-100	60-100	55-95	35-65	15-35
	39-60	Cobbly clay loam, silty clay loam, very gravelly loam.	CL-ML, CL, ML, GM-GC	A-1, A-2, A-6, A-7	10-45	30-90	25-85	20-85	15-80	20-50	5-20

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
40C---------- Unison	0-7	Cobbly loam------	ML, CL, CL-ML	A-4, A-6	25-45	80-90	75-90	60-85	55-80	20-35	2-15
	7-39	Clay, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-25	75-100	65-100	60-100	55-95	35-65	15-35
	39-60	Cobbly clay loam, silty clay loam, very gravelly loam.	CL-ML, CL, ML, GM-GC	A-1, A-2, A-6, A-7	10-45	30-90	25-85	20-85	15-80	20-50	5-20
41C*, 41D*, 41E*: Weikert---------	0-3	Shaly silt loam	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-15	Weathered bedrock	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks----------	0-5	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	5-21	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	21-32	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
42B---------- Zoar	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-40	3-15
	9-28	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	30-55	11-32
	28-65	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-60	11-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
1B, 1C, 1D--------	0-5	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.24	3	.5-3
Berks	5-21	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	21-32	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	32	---	---	---	---	---	----------	----		
2B, 2C----------	0-5	10-27	1.40-1.60	0.6-2.0	0.14-0.18	3.6-5.5	Low----------	0.43	3-2	1-4
Blairton	5-21	18-35	1.50-1.70	0.2-0.6	0.08-0.14	3.6-5.5	Low----------	0.32		
	21-36	10-27	1.40-1.60	0.2-2.0	0.04-0.10	3.6-5.5	Low----------	0.32		
	36	---	---	---	---	---	----------	----		
3C----------	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.20	3.6-5.5	Moderate-----	0.32	3-2	1-3
Buchanan	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Moderate-----	0.24		
	20-60	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Moderate-----	0.17		
4C----------	0-7	10-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Moderate-----	0.24	3-2	1-3
Buchanan	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Moderate-----	0.24		
	20-60	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Moderate-----	0.17		
5----------	0-7	10-27	1.20-1.40	0.6-2.0	0.12-0.22	6.6-8.4	Low----------	0.37	3	2-4
Buckton	7-48	18-35	1.30-1.50	0.6-2.0	0.14-0.19	7.4-8.4	Low----------	0.28		
	48-73	5-15	1.30-1.50	0.6-6.0	0.06-0.14	7.4-8.4	Low----------	0.28		
6C*:										
Carbo----------	0-7	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	7-32	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	High----------	0.24		
	32	---	---	---	---	---	----------	----		
Endcav----------	0-7	30-40	1.20-1.40	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37	2	.5-2
	7-50	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High----------	0.20		
	50	---	---	---	---	---	----------	----		
7C*:										
Carbo----------	0-7	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	7-32	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	High----------	0.24		
	32	---	---	---	---	---	----------	----		
Endcav----------	0-7	30-40	1.20-1.40	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37	2	.5-2
	7-50	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High----------	0.20		
	50	---	---	---	---	---	----------	----		
Rock outcrop.										
8C, 8D----------	0-4	12-22	1.30-1.40	2.0-20	0.10-0.14	4.5-5.5	Low----------	0.15	1	1-3
Cataska	4-17	12-22	1.30-1.45	2.0-20	0.04-0.09	4.5-5.5	Low----------	0.15		
	17-35	---	---	---	---	---	----------	----		
	35	---	---	---	---	---	----------	----		
8E----------	0-3	12-22	1.30-1.40	2.0-20	0.10-0.14	4.5-5.5	Low----------	0.15	1	1-3
Cataska	3-10	12-22	1.30-1.45	2.0-20	0.04-0.09	4.5-5.5	Low----------	0.15		
	10-30	---	---	---	---	---	----------	----		
	30	---	---	---	---	---	----------	----		
9----------	0-10	8-20	1.20-1.40	0.6-2.0	0.13-0.18	5.6-7.3	Low----------	0.32	5	2-4
Chagrin	10-37	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.32		
	37-60	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low----------	0.32		
10C, 10D----------	0-6	5-20	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32	4	1-3
Chester	6-40	18-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.43		
	40-60	10-27	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.43		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
10E----------	0-4	5-20	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32	4	1-3
Chester	4-34	18-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.43		
	34-60	10-27	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.43		
11D*, 11E*:										
Chester----------	0-5	5-20	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.0	Low----------	0.32	4	1-3
	5-32	18-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.0	Low----------	0.43		
	32-60	10-27	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.43		
Manor----------	0-12	10-25	1.20-1.45	0.6-2.0	0.14-0.17	4.5-6.0	Low----------	0.32	3	1-3
	12-31	10-25	1.30-1.50	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.28		
	31-60	5-20	1.25-1.50	0.6-6.0	0.10-0.17	4.5-6.0	Low----------	0.28		
12D----------	0-3	30-50	1.2-1.5	0.2-2.0	0.14-0.18	6.1-7.8	Moderate-----	0.28	2	.5-2
Chilhowie	3-19	60-80	1.4-1.6	0.06-0.2	0.10-0.15	6.1-7.8	Moderate-----	0.24		
	19-23	55-80	1.2-1.5	0.06-0.2	0.02-0.05	6.6-8.4	Moderate-----	0.24		
	23	---	---	---	---	---	----------	----		
13B, 13C----------	0-6	15-27	1.25-1.55	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.32	2	.5-2
Clearbrook	6-26	20-35	1.35-1.55	0.2-0.6	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	26-38	30-50	1.35-1.55	0.2-0.6	0.04-0.10	4.5-5.5	Moderate-----	0.28		
	38	---	---	---	---	---	----------	----		
14----------	0-3	5-15	1.05-1.20	2.0-20	0.07-0.15	4.5-5.5	Low----------	0.17	5	1-5
Craigsville	3-40	5-15	1.30-1.60	2.0-20	0.06-0.15	4.5-5.5	Low----------	0.17		
	40-60	5-10	1.35-1.55	>6.0	0.04-0.09	4.5-5.5	Low----------	0.17		
15E----------	0-5	10-20	1.20-1.50	2.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	3	2-4
Dekalb	5-24	7-18	1.20-1.50	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	24-39	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	39	---	---	---	---	---	----------	----		
16F*:										
Drall----------	0-4	5-18	1.25-1.40	6.0-20	0.04-0.08	4.0-5.5	Low----------	0.17	3	.5-2
	4-22	5-15	1.25-1.40	6.0-20	0.04-0.08	4.0-5.5	Low----------	0.17		
	22-42	15-45	1.30-1.60	6.0-20	0.08-0.12	4.0-5.5	Low----------	----		
	42	---	---	---	---	---	----------	----		
Rubble land.										
17B, 17C----------	0-9	10-27	1.00-1.25	0.6-6.0	0.17-0.22	4.5-5.5	Low----------	0.37	4	.5-2
Dyke	9-44	35-70	1.25-1.55	0.6-2.0	0.14-0.19	4.5-5.5	Moderate-----	0.28		
	44-66	27-40	1.25-1.55	0.6-2.0	0.06-0.12	4.5-6.0	Moderate-----	0.28		
18B, 18C----------	0-7	10-25	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.3	Low----------	0.37	3	.5-2
Endcav	7-50	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High---------	0.20		
	50	---	---	---	---	---	----------	----		
19B, 20B, 20C----	0-6	12-27	1.00-1.20	0.6-6.0	0.08-0.14	5.6-6.5	Low----------	0.17	4	0-2
Hawksbill	6-25	18-35	1.20-1.50	0.6-2.0	0.08-0.14	5.6-7.3	Low----------	0.17		
	25-47	15-35	1.20-1.50	0.6-2.0	0.04-0.10	5.6-7.3	Low----------	0.17		
	47-60	10-35	1.20-1.60	0.6-6.0	0.04-0.10	5.6-7.3	Low----------	0.17		
21D----------	0-12	10-25	1.00-1.20	0.6-6.0	0.15-0.17	4.5-6.0	Low----------	0.17	4	1-3
Lew	12-60	28-40	1.20-1.50	0.6-2.0	0.11-0.16	4.5-6.0	Moderate-----	0.17		
22E----------	0-12	10-25	1.00-1.20	0.6-6.0	0.13-0.15	4.5-6.0	Low----------	0.17	4	1-3
Lew	12-60	28-40	1.20-1.50	0.6-2.0	0.11-0.16	4.5-6.0	Moderate-----	0.17		
23B, 23C, 23D, 24B, 24C, 24D, 25C, 25D--------	0-6	12-25	1.20-1.50	0.6-6.0	0.14-0.18	4.5-5.5	Low----------	0.37	3	.5-2
Lodi	6-41	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.28		
	41-63	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
26C*:										
Lodi	0-6	12-25	1.20-1.50	0.6-6.0	0.14-0.18	4.5-5.5	Low	0.37	3	.5-2
	6-41	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate	0.28		
	41-63	---	---	---	---	---	---	---		
Rock outcrop.										
26E*:										
Lodi	0-5	12-25	1.20-1.50	0.6-6.0	0.14-0.18	4.5-5.5	Low	0.37	3	.5-2
	5-41	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate	0.28		
	41-63	---	---	---	---	---	---	---		
Rock outcrop.										
27B	0-12	0-10	1.20-1.50	6.0-20	0.04-0.08	6.1-7.3	Low	0.17	2	.5-1
Millrock	12-43	0-10	1.45-1.65	6.0-20	0.04-0.08	6.1-7.3	Low	0.17		
	43-60	0-10	1.45-1.65	6.0-20	0.04-0.08	6.1-7.3	Low	0.17		
28B, 28C	0-11	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low	0.43	3	2-4
Monongahela	11-24	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.43		
	24-53	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low	0.43		
	53-60	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low	0.37		
29C	0-6	18-35	1.40-1.70	0.6-6.0	0.16-0.21	4.5-6.5	Low	0.32	4	1-3
Montalto	6-53	30-55	1.60-1.90	0.2-0.6	0.14-0.21	5.1-6.5	High	0.28		
	53-60	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	Moderate	0.28		
30C, 30D	0-6	5-20	1.20-1.50	2.0-6.0	0.14-0.20	4.5-6.0	Low	0.37	4	1-3
Myersville	6-16	18-35	1.20-1.50	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.32		
	16-52	10-32	1.20-1.50	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.32		
	52-60	---	---	---	---	---	---	---		
31C*, 31D*, 31E*:										
Myersville	0-6	5-20	1.20-1.50	2.0-6.0	0.14-0.20	4.5-6.0	Low	0.32	4	1-3
	6-16	18-35	1.20-1.50	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.32		
	16-52	10-32	1.20-1.50	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.32		
	52-60	---	---	---	---	---	---	---		
Catoctin	0-5	5-20	1.20-1.50	2.0-6.0	0.14-0.20	5.1-6.5	Low	0.32	2	1-3
	5-13	10-35	1.20-1.50	2.0-6.0	0.08-0.16	5.1-6.5	Low	0.24		
	13-24	10-25	1.20-1.50	2.0-6.0	0.04-0.15	5.6-7.3	Low	0.24		
	24	---	---	---	---	---	---	---		
32C*, 32D*, 32E*:										
Myersville	0-6	5-20	1.20-1.50	2.0-6.0	0.14-0.20	4.5-6.0	Low	0.32	4	1-3
	6-16	18-35	1.20-1.50	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.32		
	16-52	10-32	1.20-1.50	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.32		
	52-60	---	---	---	---	---	---	---		
Montalto	0-6	18-35	1.40-1.70	0.6-6.0	0.15-0.20	4.5-6.5	Low	0.28	4	1-3
	6-53	30-55	1.60-1.90	0.2-0.6	0.14-0.21	5.1-6.5	High	0.28		
	53-60	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	Moderate	0.28		
33	0-10	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low	0.43	5	1-4
Newark	10-44	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
	44-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low	0.43		
34*.										
Pits										
35	0-6	18-35	1.30-1.50	0.2-0.6	0.18-0.24	3.6-5.5	Moderate	0.43	3	2-4
Purdy	6-32	35-50	1.30-1.60	<0.2	0.12-0.18	3.6-5.5	Moderate	0.28		
	32-60	35-50	1.30-1.60	<0.2	0.10-0.16	3.6-5.5	Moderate	0.28		
36E	0-6	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.0	Low	0.24	4	.5-3
Rigley	6-41	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low	0.24		
	41-60	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low	0.24		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
37D*:										
Rigley	0-6	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.0	Low	0.24	4	.5-3
	6-41	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low	0.24		
	41-60	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low	0.24		
Weikert	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.28	2	1-3
	3-15	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low	0.28		
	15	---	---	---	---	---	---	---		
Berks	0-5	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.24	3	.5-3
	5-21	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	21-32	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	32	---	---	---	---	---	---	---		
38B, 38C	0-10	15-27	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	Low	0.37	3	.5-2
Sequoia	10-38	35-60	1.35-1.55	0.2-0.6	0.08-0.16	4.5-5.5	Moderate	0.24		
	38-60	---	---	---	---	---	---	---		
39B, 39C, 39D	0-7	10-25	1.35-1.65	0.6-6.0	0.14-0.20	4.5-6.0	Low	0.32	4	1-3
Unison	7-39	30-70	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate	0.24		
	39-60	30-50	1.30-1.60	0.6-6.0	0.08-0.16	4.5-6.0	Moderate	0.28		
40C	0-7	10-25	1.35-1.65	0.6-6.0	0.11-0.17	4.5-6.0	Low	0.24	4	1-3
Unison	7-39	30-70	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate	0.24		
	39-60	30-50	1.30-1.60	0.6-6.0	0.08-0.16	4.5-6.0	Moderate	0.24		
41C*, 41D*, 41E*:										
Weikert	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.28	2	1-3
	3-15	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low	0.28		
	15	---	---	---	---	---	---	---		
Berks	0-5	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.24	3	.5-3
	5-21	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	21-32	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	32	---	---	---	---	---	---	---		
42B	0-9	15-30	1.20-1.40	0.6-2.0	0.15-0.18	4.5-5.5	Low	0.43	3	1-4
Zoar	9-28	35-50	1.30-1.60	0.06-0.6	0.12-0.15	4.5-5.5	Moderate	0.32		
	28-65	35-50	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Moderate	0.37		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Ri
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Unc
					Ft			In			
1B, 1C, 1D---------- Berks	C	None----------	---	---	>6.0	---	---	20-40	Soft	Low-------	Low
2B, 2C---------- Blairton	C	None----------	---	---	0.5-3.0	Perched	Nov-Mar	20-40	Soft	High------	Hig
3C, 4C---------- Buchanan	C	None----------	---	---	0.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Hig
5---------- Buckton	B	Occasional	Very brief	Dec-Jun	>6.0	---	---	>60	---	Moderate	Low
6C*: Carbo---------- Endcav----------	C C	None---------- None----------	--- ---	--- ---	>6.0 >6.0	--- ---	--- ---	20-40 >40	Hard Hard	Moderate Moderate	Hig Hig
7C*: Carbo---------- Endcav---------- Rock outcrop.	C C	None---------- None----------	--- ---	--- ---	>6.0 >6.0	--- ---	--- ---	20-40 >40	Hard Hard	Moderate Moderate	Hig Hig
8C, 8D, 8E--------- Cataska	D	None----------	---	---	>6.0	---	---	20-40	Hard	---	Low
9---------- Chagrin	B	Frequent-----	Brief------	Nov-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low
10C, 10D, 10E----- Chester	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low
11D*, 11E*: Chester---------- Manor----------	B B	None---------- None----------	--- ---	--- ---	>6.0 >6.0	--- ---	--- ---	>60 >60	--- ---	Moderate Moderate	Low Low
12D---------- Chilhowie	C	None----------	---	---	>6.0	---	---	20-40	Hard	Moderate	Hig
13B, 13C---------- Clearbrook	D	None----------	---	---	0-0.5	Apparent	Oct-Apr	20-40	Soft	Moderate	Hig
14---------- Craigsville	B	Frequent-----	Very brief	Nov-May	>6.0	---	---	>60	---	Moderate	Low
15E---------- Dekalb	C	None----------	---	---	>6.0	---	---	20-40	Hard	Low-------	Low

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		
					Ft			In			
16F*: Drall	B	None	---	---	>6.0	---	---	40-60	Hard	Low	Lo
Rubble land.											
17B, 17C Dyke	B	None	---	---	---	---	---	>60	---	Moderate	Hi
18B, 18C Endcav	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	Hi
19B, 20B, 20C Hawksbill	B	Occasional	Very brief	Apr-Oct	>6.0	---	---	>60	---	Moderate	Lo
21D, 22E Lew	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
23B, 23C, 23D, 24B, 24C, 24D, 25C, 25D Lodi	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
26C*, 26E*: Lodi	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
Rock outcrop.											
27B Millrock	A	Frequent	Very brief	Dec-Apr	>6.0	---	---	>60	---	Low	Lo
28B, 28C Monongahela	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Hi
29C Montalto	C	None	---	---	>6.0	---	---	>60	---	Moderate	Hi
30C, 30D Myersville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
31C*, 31D*, 31E*: Myersville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
Catoctin	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Hi
32C*, 32D*, 32E*: Myersville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Mo
Montalto	C	None	---	---	>6.0	---	---	>60	---	Moderate	Hi
33 Newark	C	Frequent	Brief	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High	Hi
34*. Pits											

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	U
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		
					Ft			In			
35---------- Purdy	D	None--------	---	---	+1-1.0	Apparent	Nov-Jun	>60	---	High-----	Hi
36E---------- Rigley	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Lo
37D*:											
Rigley----------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Lo
Weikert----------	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Mo
Berks----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Lo
38B, 38C---------- Sequoia	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Hi
39B, 39C, 39D, 40C---------- Unison	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Hi
41C*, 41D*, 41E*:											
Weikert----------	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Mo
Berks----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Lo
42B---------- Zoar	C	None--------	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	Hi

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Blairton	Fine-loamy, mixed, mesic Aquic Hapludults
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Buckton	Fine-silty, mixed (calcareous), mesic Typic Udifluvents
Carbo	Very-fine, mixed, mesic Typic Hapludalfs
Cataska	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Catoctin	Loamy-skeletal, mixed, mesic Ruptic-Alfic Eutrochrepts
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Chester	Fine-loamy, mixed, mesic Typic Hapludults
Chilhowie	Very-fine, mixed, mesic Typic Hapludalfs
Clearbrook	Loamy-skeletal, mixed, mesic Aeric Ochraquults
Craigsville	Loamy-skeletal, mixed, mesic Fluventic Dystrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Drall	Sandy-skeletal, siliceous, mesic Typic Udorthents
Dyke	Clayey, mixed, mesic Typic Rhodudults
Endcav	Very-fine, mixed, mesic Typic Hapludalfs
Hawksbill	Loamy-skeletal, mixed, mesic Typic Hapludalfs
Low	Loamy-skeletal, mixed, mesic Typic Hapludults
Lodi	Clayey, mixed mesic Typic Hapludults
*Manor	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
*Millrock	Mixed, mesic Alfic Udipsamments
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Montalto	Fine, mixed, mesic Ultic Hapludalfs
Myersville	Fine-loamy, mixed, mesic Ultic Hapludalfs
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
*Purdy	Clayey, mixed, mesic Typic Ochraquults
Rigley	Coarse-loamy, mixed, mesic Typic Hapludults
Sequoia	Clayey, mixed, mesic Typic Hapludults
Unison	Clayey, mixed, mesic Typic Hapludults
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Zoar	Clayey, mixed, mesic Aquic Hapludults

*The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1983 O - 389-956

Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The USDA Target Center can convert USDA information and documents into alternative formats, including Braille, large print, video description, diskette, and audiotape. For more information, visit the TARGET Center's Web site (http://www.targetcenter.dm.usda.gov/) or call (202) 720-2600 (Voice/TTY).

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

GENERAL SOIL MAP

WARREN COUNTY, VIRGINIA

Scale 1:126,720

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

LEGEND

SOILS FORMED IN RESIDUUM OF LIMESTONE AND INTERBEDDED LIMESTONE AND CALCAREOUS SHALE, AND ROCK OUTCROP; ON UPLANDS

1 — Lodi-Endcav: Deep, well drained soils that have a clayey subsoil

2 — Rock outcrop-Carbo-Chilhowie: Rock outcrop and moderately deep, well drained soils that have a clayey subsoil

SOILS FORMED IN ALLUVIAL OR COLLUVIAL MATERIAL; ON FLOOD PLAINS, TERRACES, AND MOUNTAIN FOOT SLOPES

3 — Unison-Chagrin-Dyke: Deep, well drained soils that have a loamy or clayey subsoil

SOILS FORMED IN RESIDUUM OF SHALE AND SANDSTONE; ON UPLANDS

4 — Berks-Blairton-Weikert: Moderately deep or shallow, well drained to somewhat poorly drained soils that have a loamy subsoil

5 — Berks-Weikert-Sequoia: Shallow to deep, well drained soils that have a loamy or clayey subsoil

SOILS FORMED MAINLY IN GREENSTONE; ON UPLANDS

6 — Myersville-Montalto-Lew: Deep, well drained soils that have a loamy or clayey subsoil

7 — Chester-Manor: Deep, well drained soils that have a loamy subsoil

8 — Cataska-Dekalb: Shallow or moderately deep, well drained soils that have a loamy subsoil

SOILS FORMED IN RESIDUUM OF SANDSTONE AND SHALE; ON UPLANDS

9 — Rigley-Drall-Weikert: Deep or shallow, well drained and excessively drained soils that have a loamy or sandy subsoil

10 — Weikert-Berks-Buchanan: Shallow to deep, well drained and somewhat poorly drained soils that have a loamy subsoil

Compiled 1983

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
WARREN COUNTY, VIRGINIA

Scale 1:126,720

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

N

Inset, sheet 1

Inset, sheet 29

Inset, sheet 13

Inset, sheet 21

Inset, sheet 21

Inset, sheet 28

Inset, sheet 28

78°10′

78°20′

39°00′

38°50′

FREDERICK COUNTY

CLARKE COUNTY

PAGE COUNTY

SHENANDOAH COUNTY

PAGE COUNTY

PARK COUNTY

RAPPAHANNOCK COUNTY

FAUQUIER COUNTY

SHENANDOAH NATIONAL FOREST

SHENANDOAH NATIONAL PARK

Reliance

Rockland

Milldale

Cedarville

Howellsville

Waterlick

Buckton

Bethel

Happy Creek

Linden

FRONT ROYAL

Limeton

Bentonville

Brown town

Cedar Creek

West Run

Crooked Run

Western Run

Willow Brook

Venus Branch

Howellsville Branch

Passage Creek

North Fork

Cabin Run

Leach Run

Manassas Ridge

Dry Run

Happy Creek

Gooney Run

Sloan Creek

Lands Run

Smith Cr.

Grassy Run

Brock Run

Skyline Drive

Blue Ridge Mountain

Shenandoah River

Shenandoah and Norfolk Southern

Washington and Jefferson

Massanutten Mountain

George Washington and Jefferson National Forest

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

SOIL LEGEND

Publication symbols consist of numbers or a combination of numbers and letters (e.g., 5, 38B, or 16F). A capital letter of B, C, D, E, or F, following a number indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

SYMBOL	NAME
1B	Berks shaly silt loam, 2 to 7 percent slopes
1C	Berks shaly silt loam, 7 to 15 percent slopes
1D	Berks shaly silt loam, 15 to 25 percent slopes
2B	Blairton silt loam, 2 to 7 percent slopes
2C	Blairton silt loam, 7 to 15 percent slopes
3C	Buchanan fine sandy loam, 7 to 15 percent slopes
4C	Buchanan very stony fine sandy loam, 7 to 15 percent slopes
5	Buckton silt loam
6C	Carbo-Endcav silty clay loams, very rocky, 7 to 15 percent slopes
7C	Carbo-Endcav-Rock outcrop complex, 7 to 15 percent slopes
8C	Cataska slaty silt loam, 7 to 15 percent slopes
8D	Cataska slaty silt loam, 15 to 25 percent slopes
8E	Cataska slaty silt loam, 25 to 65 percent slopes
9	Chagrin fine sandy loam
10C	Chester loam, 7 to 15 percent slopes
10D	Chester loam, 15 to 25 percent slopes
10E	Chester loam, 25 to 65 percent slopes
11D	Chester-Manor very stony complex, 15 to 25 percent slopes
11E	Chester-Manor very stony complex, 25 to 65 percent slopes
12D	Chilhowie silty clay loam, rocky, 15 to 25 percent slopes
13B	Clearbrook shaly silt loam, 2 to 7 percent slopes
13C	Clearbrook shaly silt loam, 7 to 15 percent slopes
14	Craigsville cobbly sandy loam
15E	Dekalb channery loam, 25 to 65 percent slopes
16F	Drall-Rubble land complex, 35 to 70 percent slopes
17B	Dyke loam, 2 to 7 percent slopes
17C	Dyke loam, 7 to 15 percent slopes
18B	Endcav silt loam, 2 to 7 percent slopes
18C	Endcav silt loam, 7 to 15 percent slopes
19B	Hawksbill cobbly loam, 2 to 7 percent slopes
20B	Hawksbill very cobbly loam, 2 to 7 percent slopes
20C	Hawksbill very cobbly loam, 7 to 15 percent slopes
21D	Lew channery loam, 7 to 25 percent slopes
22E	Lew very stony loam, 25 to 65 percent slopes
23B	Lodi silt loam, 2 to 7 percent slopes
23C	Lodi silt loam, 7 to 15 percent slopes
23D	Lodi silt loam, 15 to 25 percent slopes
24B	Lodi silt loam, rocky, 2 to 7 percent slopes
24C	Lodi silt loam, rocky, 7 to 15 percent slopes
24D	Lodi silt loam, rocky, 15 to 25 percent slopes
25C	Lodi silt loam, very rocky, 7 to 15 percent slopes
25D	Lodi silt loam, very rocky, 15 to 25 percent slopes
26C	Lodi-Rock outcrop complex, 2 to 15 percent slopes
26E	Lodi-Rock outcrop complex, 15 to 45 percent slopes
27B	Millrock loamy fine sand, 0 to 7 percent slopes
28B	Monongahela loam, 2 to 7 percent slopes
28C	Monongahela loam, 7 to 15 percent slopes
29C	Montalto loam, 7 to 15 percent slopes
30C	Myersville silt loam, 7 to 15 percent slopes
30D	Myersville silt loam, 15 to 25 percent slopes
31C	Myersville-Catoctin very stony silt loams, 7 to 15 percent slopes
31D	Myersville-Catoctin very stony silt loams, 15 to 25 percent slopes
31E	Myersville-Catoctin very stony silt loams, 25 to 65 percent slopes
32C	Myersville and Montalto very stony soils, 7 to 15 percent slopes
32D	Myersville and Montalto very stony soils, 15 to 25 percent slopes
32E	Myersville and Montalto very stony soils, 25 to 65 percent slopes
33	Newark silt loam
34	Pits, quarries, and dumps
35	Purdy loam
36E	Rigley very stony sandy loam, 25 to 60 percent slopes
37D	Rigley-Weikert-Berks very stony complex, 15 to 25 percent slopes
38B	Sequoia silt loam, 2 to 7 percent slopes
38C	Sequoia silt loam, 7 to 15 percent slopes
39B	Unison loam, 2 to 7 percent slopes
39C	Unison loam, 7 to 15 percent slopes
39D	Unison loam, 15 to 25 percent slopes
40C	Unison cobbly loam, 7 to 15 percent slopes
41C	Weikert-Berks shaly silt loams, 7 to 15 percent slopes
41D	Weikert-Berks shaly silt loams, 15 to 25 percent slopes
41E	Weikert-Berks shaly silt loams, 25 to 65 percent slopes
42B	Zoar silt loam, 0 to 7 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline
- AD HOC BOUNDARY (label) — Hedley Airstrip
- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water, w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 12D, 11E

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot — 0

WARREN COUNTY, VIRGINIA — SHEET NUMBER 1

WARREN COUNTY, VIRGINIA NO. 1

This map is compiled on 1375 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 065 000 FEET

2 050 000 FEET

490 000 FEET

495 000 FEET

FREDERICK COUNTY

SHENANDOAH COUNTY

Cedar Creek

Cullett Run

Dry Run

West Run

Sheep Run

Booth Run

Mulley Run

Reliance

(Joins lower left)

(Joins upper right)

(Joins sheet 2)

(Joins sheet 4) 2 060 000 FEET

(Joins sheet 5) 2 080 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

WARREN COUNTY, VIRGINIA — SHEET NUMBER 2

(2)

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

2 100 000 FEET

495 000 FEET

490 000 FEET

2 085 000 FEET

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 6)

CLARKE COUNTY

FREDERICK COUNTY

Nineveh

Bunker Hill

Ashby

Toney Hollow Run

Crooked Run

Western and Norfolk Wiltow Brook

340 522

639

735

661

7C 6C 18B 23B 18C 23C 1C 41E 1B 41D 13C 42B 33 12D 1D 18C 23B 25C 24C 26C 24B 26E 23D 24D 25C 26E

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 2

WARREN COUNTY, VIRGINIA — SHEET NUMBER 3

WARREN COUNTY, VIRGINIA NO. 3

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 105 000 FEET

495 000 FEET

490 000 FEET

2 120 000 FEET

(Joins sheet 2)

(Joins inset, sheet 29)

(Joins sheet 7)

White Oak Level

CLARKE COUNTY

Morgan Run

Marsh Run

Scale 1:15 840

1 Mile

5 000 Feet

N

WARREN COUNTY, VIRGINIA — SHEET NUMBER 4

(4)

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

1/4 1 000

1/2 2 000

3/4 4 000

1 5 000

(Joins inset, sheet 1)

2 060 000 FEET

480 000 FEET

475 000 FEET

(Joins sheet 5)

(Joins sheet 9) | 2 050 000 FEET

Cedar Creek

SHENANDOAH RIVER

NORTH FORK SHENANDOAH

COUNTY

SOUTHERN

Waterlick

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 4

WARREN COUNTY, VIRGINIA — SHEET NUMBER 5

WARREN COUNTY, VIRGINIA NO. 5

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5

N

1 Mile

5 000 Feet

Scale 1:15 840

2 065 000 FEET

480 000 FEET

475 000 FEET

2 080 000 FEET

(Joins sheet 1)

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 10)

Molly Booth Lane

John Run

NORTH FORK SHENANDOAH RIVER

SOUTHERN

Passage Creek

Molly Camel Run

West Run

Sheep Run

Ritenour Run

The Pine Hills Community Church

6

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

(Joins sheet 2)

2 100 000 FEET

485 000 FEET

475 000 FEET

2 085 000 FEET

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 11)

Success

Rockland

Cedarville

Brook

Run

West

Ritenour

Crooked

Willow

WESTERN AND NORFOLK

SHENANDOAH RIVER

Horseshoe Bend

This map is compiled on 1:15 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 6

WARREN COUNTY, VIRGINIA — SHEET NUMBER 7

WARREN COUNTY, VIRGINIA NO. 7

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximatery positioned.

7

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 12)

2 105 000 FEET

2 120 000 FEET

485 000 FEET

475 000 FEET

Milldale

Smith Hollow

Shenandoah Valley Golf Club

Shenandoah Farms

Howellsville

Border

Marsh Run

RIVER

Dry Run

Howellsville Branch

SHENANDOAH

8

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 7)

39B

(Joins inset)

485 000 FEET

475 000 FEET

2 125 000 FEET

(Joins sheet 13)

SHENANDOAH RIVER

Venus Hill

Rock Spring Branch

Branch

Houselsville Branch

CLARKE COUNTY

FAUQUIER COUNTY

APPALACHIAN TRAIL

water

638

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 8

WARREN COUNTY, VIRGINIA NO. 9

This map is compiled on 1976 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 050 000 FEET

470 000 FEET

(Joins sheet 4)

(Joins sheet 10)

(Joins sheet 14)

460 000 FEET

2 065 000 FEET

9

N

1 Mile

5 000 Feet

Scale 1:15 840

1 5 000 0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

Meneka Peak

MASSANUTTEN MOUNTAIN

SHENANDOAH MOUNTAIN

Shenandoah Valley Overlook

COUNTY

Passage Creek

Cabin Run

Buzzard Rock

GEORGE WASHINGTON NATIONAL FOREST

MASSANUTTEN MOUNTAIN

water

Creek

B78

613

615

55

628

10

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 9)

(Joins sheet 5)

2 080 000 FEET

470 000 FEET

460 000 FEET

2 070 000 FEET

(Joins sheet 11)

(Joins sheet 15)

Gaging Station

Buckton

Bethel

Rhodes School

MOSBY ACADEMY

FRONT ROYAL

NORTH FORK SHENANDOAH RIVER

SOUTH FORK SHENANDOAH RIVER

SOUTHERN AND WESTERN

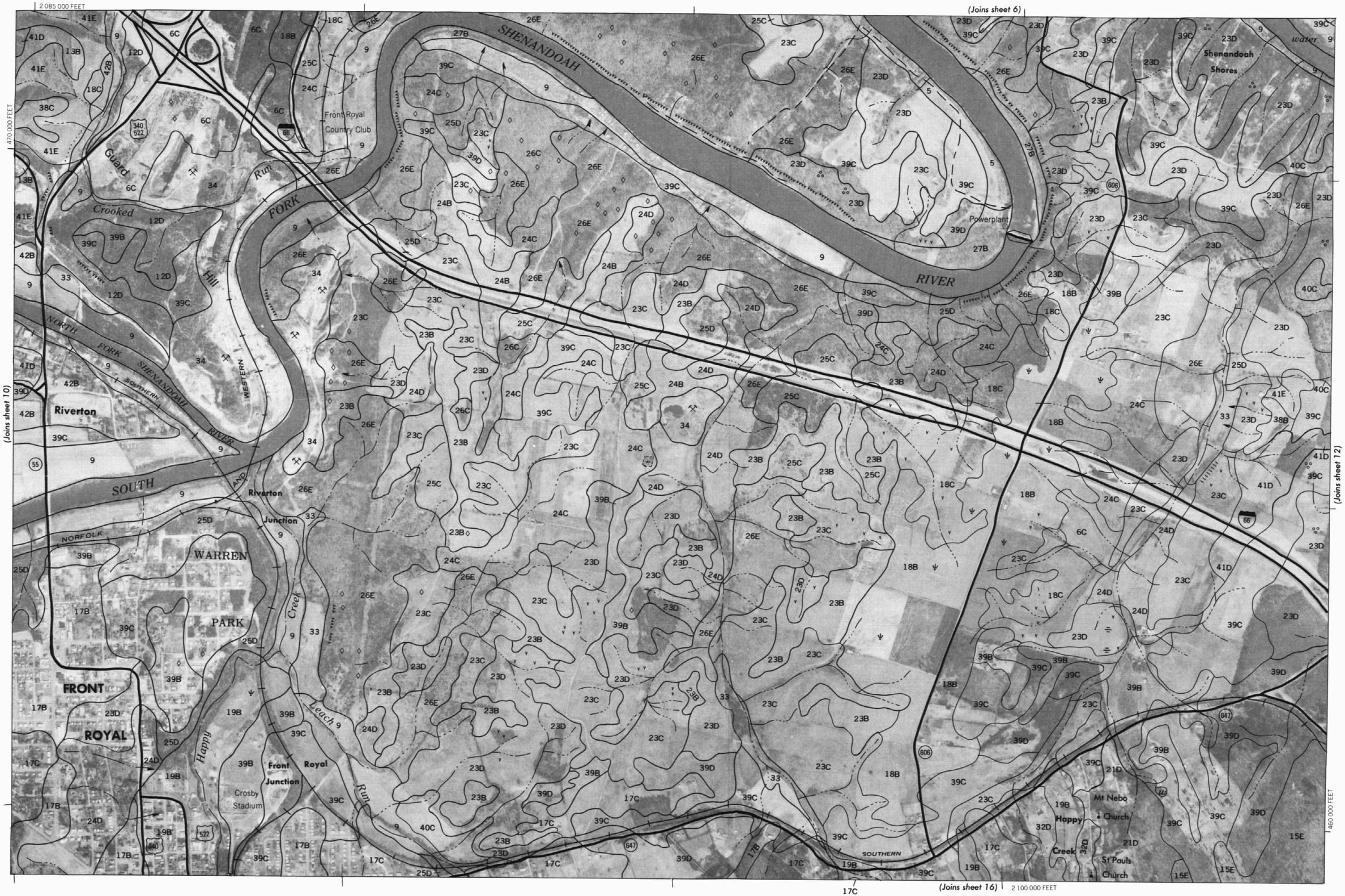
NORFOLK

Punches Run

Cabin Run

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 10



11

N

1 Mile

5 000 Feet

Scale 1:15 840

1 5 000 | ¾ 4 000 | ½ 3 000 | ¼ 2 000 | 0 1 000 | 0

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 11

WARREN COUNTY, VIRGINIA — SHEET NUMBER 12

(Joins sheet 7)

N

(Joins sheet 11)

(Joins sheet 13)

(Joins sheet 17)

Scale 1:15 840

1 Mile

5 000 Feet

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 13

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

13

N

1 Mile

5 000 Feet

Scale 1:15 840

2 125 000 FEET

(Joins sheet 8)

470 000 FEET

(Joins sheet 12)

460 000 FEET

2 140 000 FEET

2 040 000 FEET

439 000 FEET

(Joins sheet 18)

434 000 FEET

(Joins sheet 22)

2 045 000 FEET

Venus Branch

Blue Mountain

APPALACHIAN TRAIL

BLUE RIDGE

Howellsville Branch

COUNTY

FAUQUIER

SHENANDOAH NATIONAL FOREST

MASSANUTTEN MOUNTAIN

GEORGE WASHINGTON

638

8E 16F 1B 1C 20C 30C 31E 31C 32E 32D 32C 36E 37D 38B 41D 41E 4C

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

2 065 000 FEET

455 000 FEET

450 000 FEET

2 050 000 FEET

(Joins sheet 9)

(Joins sheet 15)

(Joins sheet 18)

COUNTY MOUNTAIN

Shawl Gap

GEORGE WASHINGTON NATIONAL FOREST

SHENANDOAH MASSANUTTEN

Otterburn School

Stokes Branch

Dry Run

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 14

WARREN COUNTY, VIRGINIA — SHEET NUMBER 15

WARREN COUNTY, VIRGINIA NO. 15

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 070 000 FEET

455 000 FEET

(Joins sheet 10)

(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 19)

450 000 FEET

2 085 000 FEET

Stokes Branch

WARREN COUNTY AIRPORT

STOKES AIRPORT

Rivermont Church

Catlett Mountain

Viscose City

Gaging Station

Deerpoint Campground

Bennett Chapel

SOUTH FORK SHENANDOAH RIVER

NORFOLK AND WESTERN

Skyline Caverns

Riverside

SHENANDOAH NATIONAL PARK

15

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

WARREN COUNTY, VIRGINIA — SHEET NUMBER 16

16

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 11)

2 100 000 FEET

(Joins sheet 15)

450 000 FEET

455 000 FEET

(Joins sheet 17)

(Joins sheet 20)

2 090 000 FEET

RANDOLPH MACON MILITARY ACADEMY

GOOD HOPE CEMETERY

FRONT

Townhall

County High School

PROSPECT HILL CEMETERY

ROYAL

Courthouse

WOODLAND PARK

Happy Creek

Lerch Run

water

St Pauls Church

Green Hill

Bible Church

SHENANDOAH NATIONAL PARK

SKYLINE DRIVE

US DEPT OF AGRICULTURE RESEARCH CENTER

Valley of Retreat

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 16

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 17

(Joins sheet 12)
(Joins sheet 16)
(Joins sheet 21)
(Joins inset sheet 21)

39D
2 105 000 FEET
445 000 FEET
2 120 000 FEET
450 000 FEET
42B

Hollow
Dismal
Skyland Estates
BLUE RIDGE TRAIL
Manassas Run
SOUTHERN
Manassas Gap
Linden
Hollow
APPALACHIAN
FAUQUIER COUNTY
High Knob
Valley of Retreat
Snake

17
N

1 Mile
5 000 Feet
Scale 1:15 840
0 1 000 2 000 3 000 4 000 5 000
0 ¼ ½ ¾ 1

18

N

1 Mile

5 000 Feet

0 0 Scale 1:15 840

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

(Joins sheet 14)

(Joins sheet 19)

(Joins inset, sheet 13)

(Joins sheet 23)

2 065 000 FEET

445 000 FEET

435 000 FEET

2 050 000 FEET

COUNTY

SHENANDOAH

MASSANUTTEN

MOUNTAIN

GEORGE

WASHINGTON

NATIONAL

FOREST

THE POINT

SHENANDOAH

Run

Dry

SOUTH FORK

SHENANDOAH RIVER

RIVER

McCOYS FORD

Allens Mountain

Limeton

St Pauls Church

673

613

340

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 18

WARREN COUNTY, VIRGINIA NO. 19

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 15)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 24)

2 070 000 FEET
2 085 000 FEET
445 000 FEET
435 000 FEET

SHENANDOAH RIVER
SHENANDOAH NATIONAL PARK
SOUTH FORK SHENANDOAH RIVER
NORFOLK AND WESTERN
Dingadin Heights
Asbury Church
Karo
Dickey Ridge Visitor Center
Signal Knob Overlook
Dickey Hill
Ridge
Dickey
Cooney Run
water
SKYLINE DRIVE

19
N
1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1 000 2 000 3 000 4 000 5 000

20

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

(Joins sheet 16)

2 105 000 FEET

445 000 FEET

(Joins sheet 19)

435 000 FEET

(Joins sheet 21)

(Joins sheet 25)

2 090 000 FEET

SHENANDOAH NATIONAL PARK

US DEPT OF AGRICULTURE RESEARCH CENTER

SKYLINE DRIVE

Happy Creek

Sloan Hollow

Bear Creek

Moore Run

RAPPAHANNOCK COUNTY

522 671 804

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 20

WARREN COUNTY, VIRGINIA NO. 21

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000 5 000

(Joins inset, sheet 13)

2 045 000 FEET

430 000 FEET

420 000 FEET

2 030 000 FEET

(Joins sheet 23)

(Joins inset, sheet 21)

COUNTY MOUNTAIN

SHENANDOAH

MASSANUTTEN

GEORGE WASHINGTON NATIONAL FOREST

Timber Ridge

PAGE COUNTY

SHENANDOAH RIVER

SOUTH FORK

Acorn Hill

16F 36E 37D 3C 4C 41E 42B 28B 39C 39B 41D 27B 39D 1C 1D 28C 40C 18C 26E 23D 9 33 38B

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and lines (division corners, if shown,) are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 22

WARREN COUNTY, VIRGINIA NO. 23

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 050 000 FEET

430 000 FEET

(Joins sheet 18)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 26)

2 065 000 FEET

420 000 FEET

23

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

SHENANDOAH RIVER

GEORGE WASHINGTON NATIONAL FOREST

SOUTH FORK

Bentonville Landing

Allens Mountain

WESTERN RUN

Fox Hollow

Pine Hill

Mt Carmel Church

FLINT VALLEY

NORFOLK AND WESTERN

Bentonville

Brown Hollow

PAGE

SHENANDOAH NATIONAL PARK

WARREN COUNTY, VIRGINIA — SHEET NUMBER 24

24

N

(Joins sheet 19)

2 085 000 FEET

430 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 23)

(Joins sheet 25)

420 000 FEET

(Joins sheet 27)

2 070 000 FEET

BUCK MOUNTAIN

Long Mountain

Round Mountain

Fox Hollow

Gooney Run

Glen Echo

Boyds Mill

Lands Run

Greasy

SHENANDOAH NATIONAL PARK

SKYLINE DRIVE

198

649

622

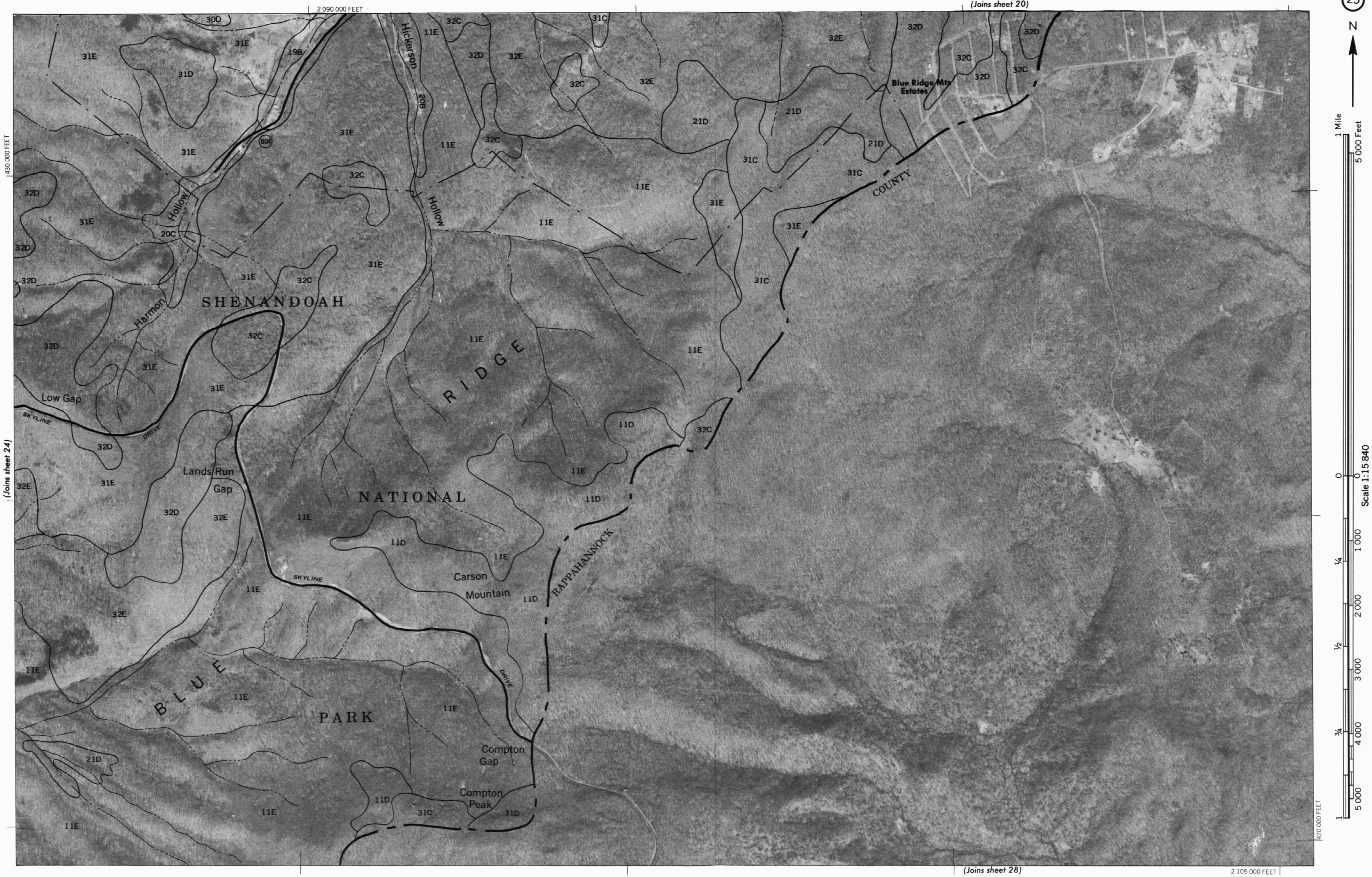
631

613

This map is compiled on 1976 aerial photography by the U.S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 24

WARREN COUNTY, VIRGINIA — SHEET NUMBER 25



WARREN COUNTY, VIRGINIA NO. 25

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

26

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

(Joins sheet 23)

2 065 000 FEET

(Joins inset B, sheet 21)

410 000 FEET

415 000 FEET

(Joins sheet 27)

(Joins inset, sheet 28)

2 050 000 FEET

Brush Mountain

Sandbank

Hollow

SHENANDOAH NATIONAL PARK

Thompson

Hollow

Arm

Matthews

Brown

Hollow

Gimlet

Ridge

Overall

PAGE

Run

COUNTY

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 26

WARREN COUNTY, VIRGINIA NO. 27

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 070 000 FEET

(Joins sheet 24)

(Joins sheet 26)

415 000 FEET

(Joins sheet 28)

410 000 FEET

(Joins sheet 29)

2 085 000 FEET

Brownlown

Cool Spring Church

Run

Smith Run

Broad Run

Greasy Run

Gooney Run

Phils Run

Long Arm

Arm Run

Creek

water

SHENANDOAH NATIONAL PARK

SKYLINE DRIVE

N

1 Mile

5 000 Feet

Scale 1:15 840

28

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

(Joins sheet 25)

2 105 000 FEET

415 000 FEET

405 000 FEET

400 000 FEET

410 000 FEET

(Joins sheet 27)

(Joins sheet 29)

(Joins inset A, sheet 28) 2 090 000 FEET

2 060 000 FEET

2 065 000 FEET

SHENANDOAH

NATIONAL

PARK

Creek

Smith

Bearwallow

Greasy Falls

Hogback Mountain

RIDGE

BLUE

PAGE

COUNTY

RAPPAHANNOCK

DRIVE

11E 11D 21D 20C 32D 32E 31E 32C

INSET A

(Joins sheet 28)

(Joins sheet 29)

2 090 000 FEET

406 000 FEET

403 000 FEET

2 087 000 FEET

3000-FOOT GRID TICKS

INSET B

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WARREN COUNTY, VIRGINIA NO. 28

WARREN COUNTY, VIRGINIA NO. 29

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 070 000 FEET

405 000 FEET

(Joins sheet 27)

SHENANDOAH NATIONAL PARK

Phils Arm Run

RIDGE

Mount Marshall

SKYLINE DRIVE

Marshall DRIVE

South Marshall

COUNTY

Gravel Springs Gap

BLUE RIDGE

Gimlet Ridge Overlook

Little Hogback Mountain

SKYLINE DRIVE

RAPPAHANNOCK

(Joins inset B, sheet 28)

(Joins inset A, sheet 28)

2 125 000 FEET

492 000 FEET

SHENANDOAH RIVER

Island

Hardin

CLARKE COUNTY

Treasure Island

Venus Branch

(Joins sheet 3)

(Joins sheet 8)

395 000 FEET

487 000 FEET

2 130 000 FEET

2 085 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840